MANAGING FOOD INSECURITY

in Conflict Vulnerable Countries through Public Policy

OUTLINE

- Why is it important to manage food insecurity?
- How can food insecurity be managed?
- Managing Availability
- Managing Access
- Managing Utilization
- Managing Stability

LEARNING OUTCOMES

- In this module students will learn about different tools to manage food insecurity.

- Specifically,
  - How to manage availability?
  - How to manage access?
  - How to manage utilization?
  - How to manage stabilization?

WHY SHOULD WE MANAGE FOOD INSECURITY?

The right to adequate food is a long-standing international human right.

"The right to adequate food is realized when every man, woman and child, alone or in community with others, has the physical and economic access at all times to adequate food or means for its procurement."

(CESCR, 1999)

WHY SHOULD WE MANAGE FOOD INSECURITY?

Amartya Sen's Capability Approach

- Resources, like land, provide capabilities to achieve something. These are capabilities, like "growing food". Capabilities, in turn, provide opportunities for functionings, like being "adequately nourished." Functionings have intrinsic values to the individual.

Resources → Capabilities → Functionings → Utility

- For example:
A peasant under feudalism has limited resources, capabilities, and functionings. A land reform increases resources (access to capital), capabilities (better seeds), and functionings (better nutrition).

HOW CAN WE MANAGE FOOD INSECURITY?

Availability
- Markets
- Equal Opportunity

Access
- Market Price Manipulation vs Free Prices
- Social Safety Nets

Utilization
- School Feeding Programs – Internalizing positive externalities
- Sugar Tax - Internalizing negative externalities

Stabilization
- Stabilizing Supply Shocks in a Closed Economy
- Stabilizing Supply Shocks in an Open Economy

MANAGING AVAILABILITY

MARKETS VS. CENTRAL PLANNING

- How should agricultural production be organized?
  - Private land ownership and markets
  - Collective land ownership and central planning

- Empirical evidence suggests that socialist countries in Central and Eastern Europe had 20% less cereal yield per hectare than market-based Western European countries

- Socialism eventually collapsed, because socialist planners failed to fill shelves in stores with food.

- How does the economic system affect production and, hence, food security?

MODEL OF COMPARATIVE INCENTIVE COMPATIBILITY

- Assume the following Cobb-Douglas Utility Function

$$\max_{C,L} U_i = C_i^\alpha L^{1-\alpha}$$

- Where
  - C = Consumption
  - L = Leisure
  - i = representative individual i

- Furthermore, assume the following
  - Consumption under Liberalism: $C_i = N_i(1 - L_i)$
  - Consumption under Socialism: $C_1 = \frac{N_1(1-L_1)+N_2(1-L_2)}{2}$ With a Society of two people

*For details see [Handout](#)

MODEL OF COMPARATIVE INCENTIVE COMPATIBILITY

Solution under Liberalism*

$$\max_{L} U_i = [N_i(1 - L_i)]^\alpha L^{1-\alpha}$$

$$\frac{dU_i}{dL_i} = \alpha[N_i(1 - L_i)]^{\alpha-1}(-N)L^{1-\alpha} + (1 - \alpha)L^{-\alpha}[N_i(1 - L_i)]^\alpha = 0$$

Rearrange

$$\alpha[N_i(1 - L_i)]^{\alpha-1}NL^{1-\alpha} = (1 - \alpha)L^{-\alpha}[N_i(1 - L_i)]^\alpha$$

Simplify to get

$$L^*_{Liberalism} = 1 - \alpha$$

*For details see Handout

Solution under Socialism*

$$\max_{L} U_i = \left[\frac{N_1(1 - L_1) + N_2(1 - L_2)}{2}\right]^\alpha L^{1-\alpha}$$

$$\frac{dU_i}{dL_i} = \alpha[\cdot]^{\alpha-1}\left(-\frac{N_i}{2}\right)L^{1-\alpha} + (1 - \alpha)L^{-\alpha}[\cdot] = 0$$

Rearrange

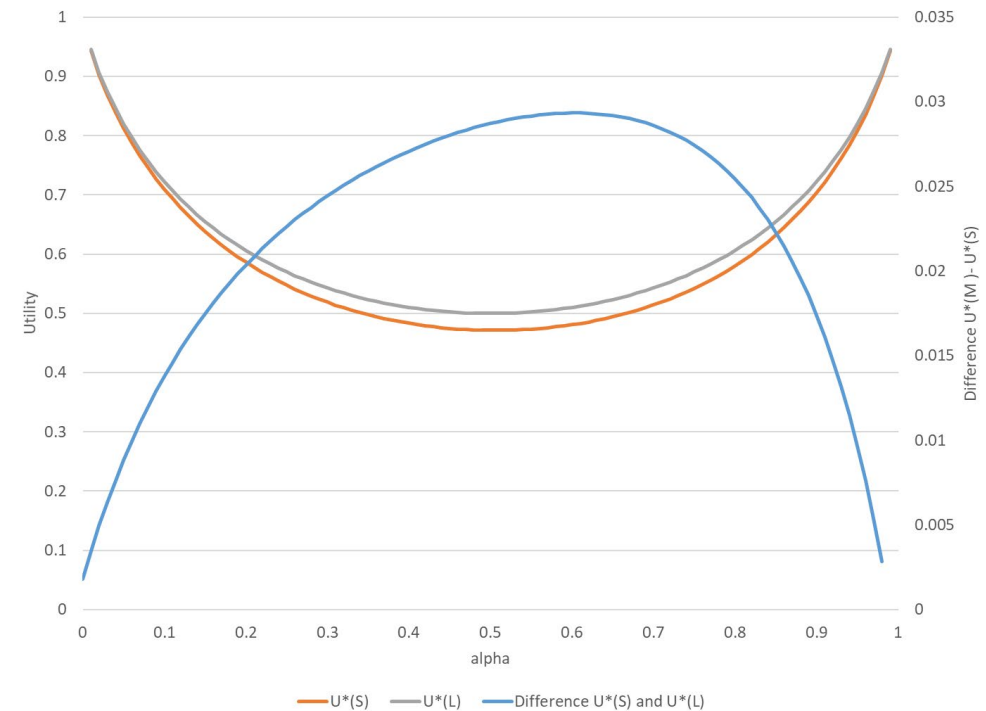$$\alpha[\cdot]^{\alpha-1}\left(\frac{N_i}{2}\right)L^{1-\alpha} = (1 - \alpha)L^{-\alpha}[\cdot]$$

Simplify to get

$$L^*_{Socialism} = \frac{1 - \alpha}{1 - \alpha/2}$$

MODEL OF COMPARATIVE INCENTIVE COMPATIBILITY

	Liberalism		Socialism
L*	$1 - \alpha$	$<$	$\dfrac{1 - \alpha}{1 - \alpha/2}$
C*	αN	$>$	$\dfrac{\alpha}{2 - \alpha} N$
U*	$\alpha^{\alpha} N^{\alpha} (1 - \alpha)^{1-\alpha}$	$>$	$\left(\dfrac{\alpha}{2-\alpha}\right)^{\alpha} N^{\alpha} \left(\dfrac{1-\alpha}{1-\alpha/2}\right)^{\alpha}$

*For details see Handout

MARKETS AND EQUAL OPPORTUNITY

- A market system is important for agricultural efficiency.

- What constitutes an efficient market system?
  - Secure absolute (as opposed to relative) property rights
  - Access to agricultural finance
  - Complementary public investments into roads, highways, and ports
  - Absence of price and production subsidies

- In Summary: Equal Opportunity

MARKETS AND EQUAL OPPORTUNITY

- How can equal opportunities be achieved?

In protecting the right to food for rural producers, Spitz (1985:312) advocates "land reform legislation, security of tenure, fairer share-cropping systems, redistribution of landholdings exceeding a certain size (to benefit the most deprived), regulating the use of common pastures and equitable allocation of fishing rights. It also requires the adoption of laws curbing usurious practices and the creation of more liberal agricultural credit systems. In addition, credit and marketing systems organized along cooperative lines supported by an adequate legislation could help small village craftsmen to increase their production and competitiveness, thereby safeguarding important sources of seasonal employment and income. However, all these laws will be ineffective if the potential beneficiaries do not have the right to organize themselves in order first to contribute to the drafting of such legislation and secondly to guarantee its enforcement."

# MANAGING ACCESS

MANAGING ACCESS

- In Module 1 we learned about the four pillars of Food Security: Availability, Access, Utilization, and Stability.

- Sometimes, the availability of food is given, but access is denied to vulnerable groups of the population.

- In particular: During chronic food insecurity, which is characterized by extended periods of poverty, people lack assets and adequate access to productive or financial resources.

- This module discusses mechanisms to address accessibility
  - Subsidies vs. cash transfers: providing vulnerable groups with financial resources
  - Crop Insurance: providing vulnerable groups with productive resources
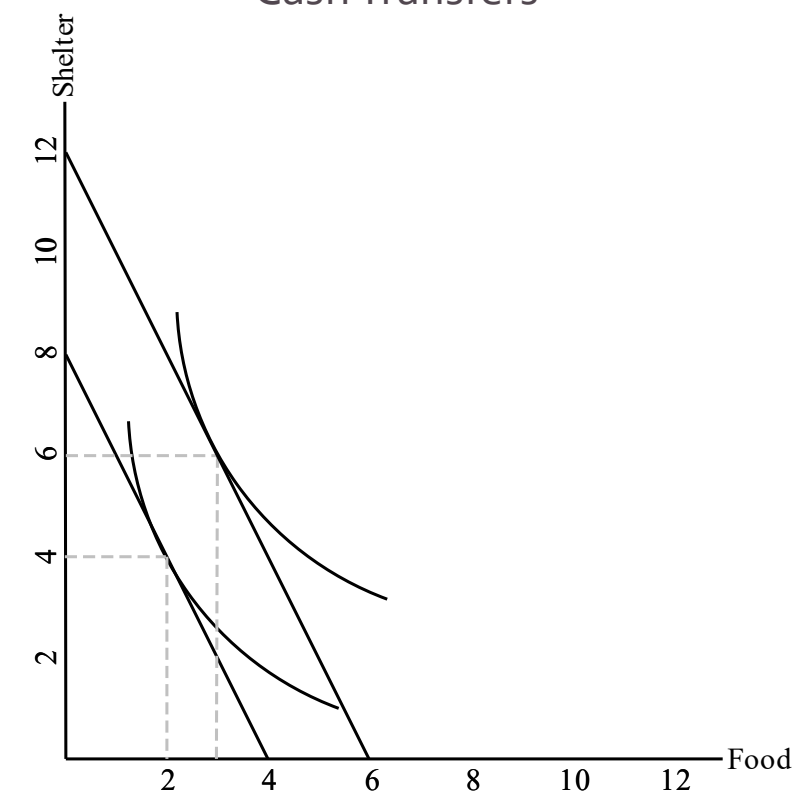
SUBSIDIES VS. CASH TRANSFERS

Baseline Scenario
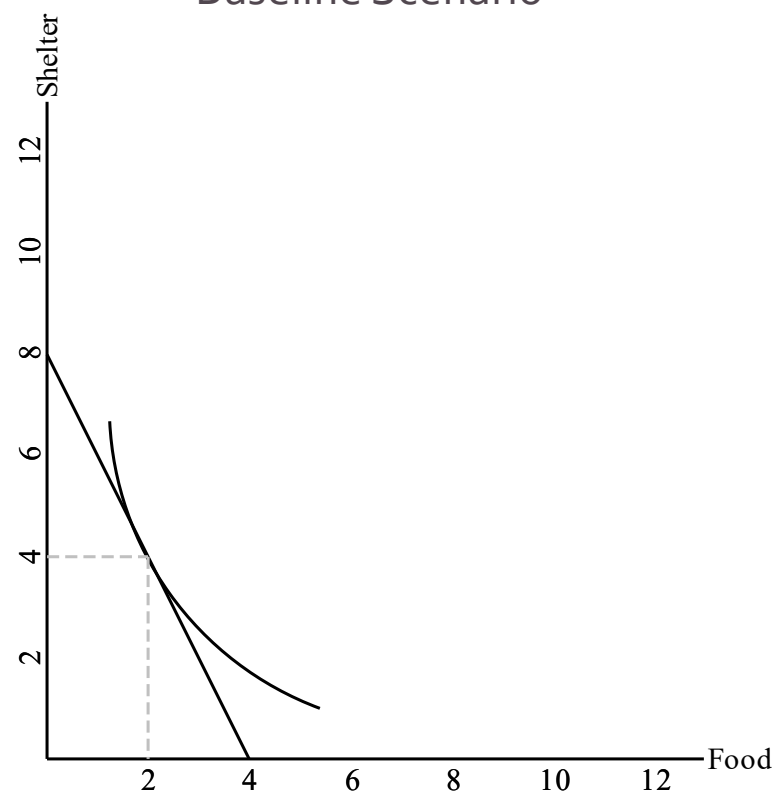
Food Price Subsidies
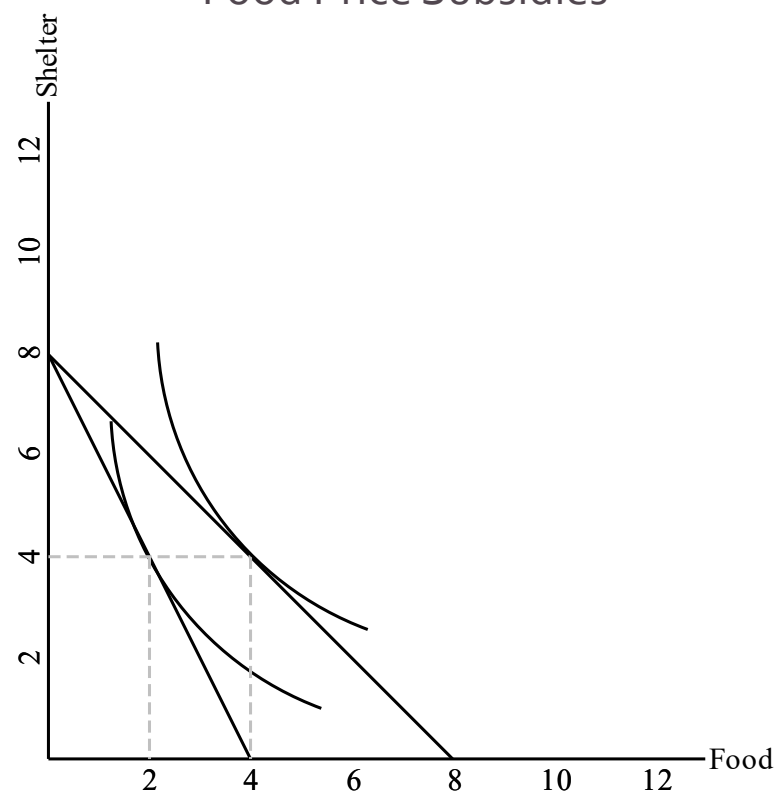
Cash Transfers

SUBSIDIES VS. CASH TRANSFERS

From an Individual's Perspective

- Food subsidies will allow the individual to consume more food, while shelter remains constant.

- Cash transfers of the same amount will not only allow the individual to consume more of both goods, but also to decide how to distribute the money most efficiently

- Food subsidies allow the individual to consume on a higher indifference curve; thus, experience more utility (happiness).

- Cash transfers, allow the individual to consume on an even higher indifference curve; thus, making the individual even better off than with food subsidies.

From the State's Perspective

- In order to provide vulnerable individuals with access to more food, the state may use food price subsidies or cash transfers

- Budget Constraint with Food Subsidy Sub (i)
$$(P_F - Sub)F + P_S S = M$$

- Budget Constraint with Cash Transfer CT (ii)
$$P_F F + P_S S = M + CT$$

- Subtracting (i) from (ii) gives
$$CT = FSub$$

- Thus, while from a state's perspective both mechanisms are equally "good," for the individual they are unequally efficient.

CROP INSURANCE

- Crop insurance secures farmers' incomes in case of a crop shortfall due to drought, flood, fire, or any other natural hazard. Thus, it also secures famers' access to food.

- Furthermore, crop insurances
  - secure future availability (food is produced)
  - secure future access (food prices don't increase)
  - foster food stability (smooths out production over time)

CROP INSURANCE

The Price of a Fair Crop Insurance

Assume the following:

- A 0.48 chance of a drought and wealth of 25
- A 0.52 chance of a rich harvest and wealth of 25 and income of 75
- The farmer's utility function $U = \sqrt{income}$

That gives:

- $Expected\ Income = 0.48 \times 25 + 0.52 \times 100 = 64$
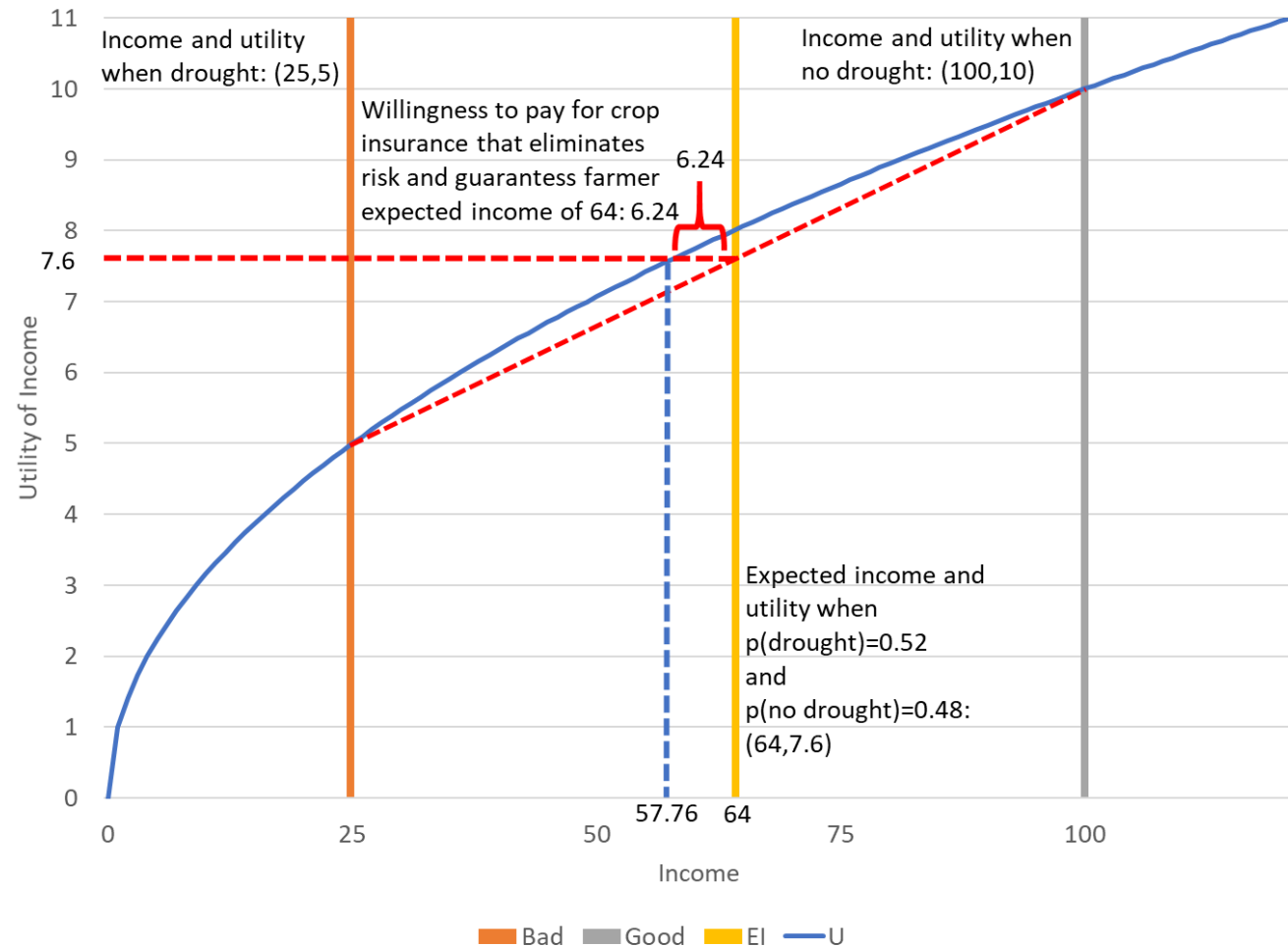- $Expected\ Utility = 0.48 \times \sqrt{25} + 0.52 \times \sqrt{100} = 7.6$

How much income would the farmer need to receive his expected utility?

- $\sqrt{x} = 7.6 \rightarrow x = 57.76$

The farmer's willingness to pay for a fair crop insurance that pays 64-25=39 in case of a drought is:

- $64 - 57.76 = 6.24$

CROP INSURANCE

Understanding and Managing Food Insecurity   20

MANAGING UTILIZATION

MANAGING UTILIZATION

- The third pillar of food security is utilization.

- Only because availability and access are given, utilization is not.

- Utilization, however, is linked to access:
  - market prices for different food categories
  - Prioritizing healthy meals
  - Advertising a lifestyle beneficial to one's health

- This module discusses mechanisms to address utilization
  - School feeding programs: internalize positive externalities from a healthy population
  - Sugar tax: eliminate negative externalities from overconsumption of sweets

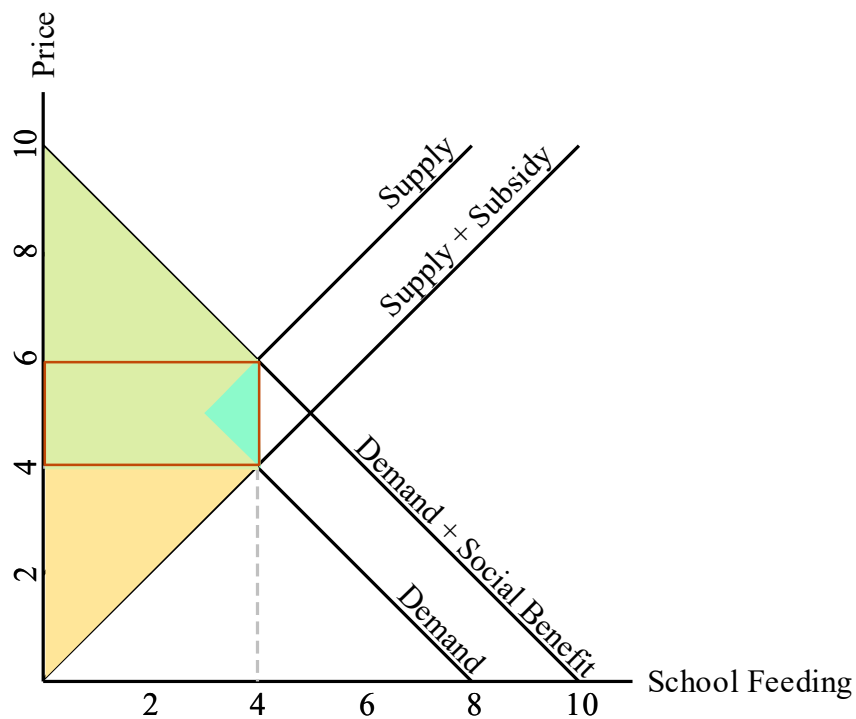# SCHOOL FEEDING PROGRAM

Supply and Demand before Subsidy
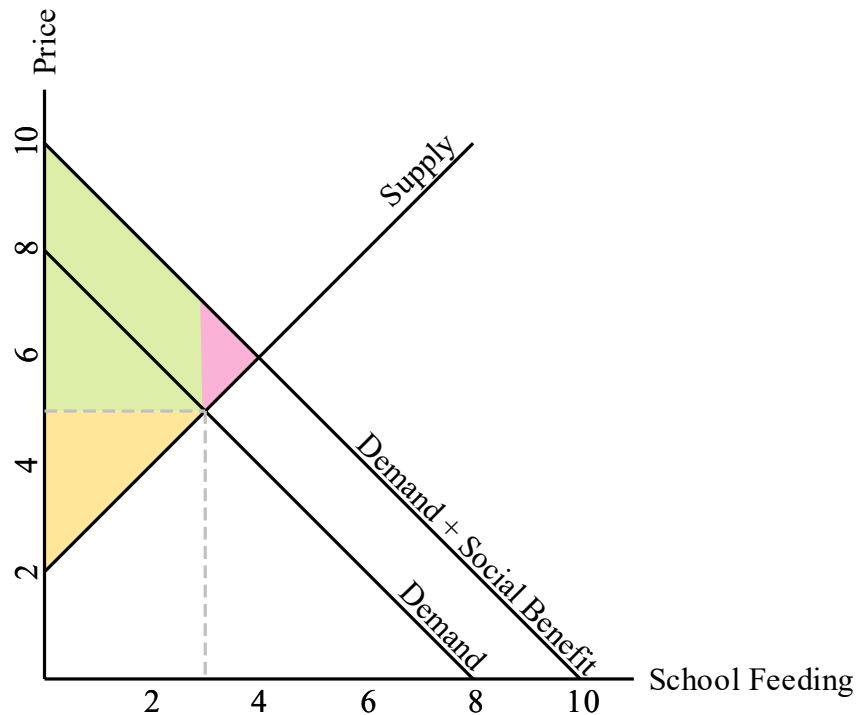
Welfare Analysis before Subsidy

- Price: 5

- Quantity: 3

Welfare	Value
Consumer Surplus ●	10.5
Producer Surplus ●	+4.5
Total Welfare	15

SCHOOL FEEDING PROGRAM

Supply and Demand after Subsidy

Welfare Analysis after Subsidy

- Price (Social Optimum): 4
- Quantity (Social Optimum): 4

Welfare		Value
Consumer Surplus 🟢		16
Producer Surplus 🟡		+8
Subsidy ⭕		-8
Total Welfare		16

SUGAR TAX

Supply and Demand before Tax
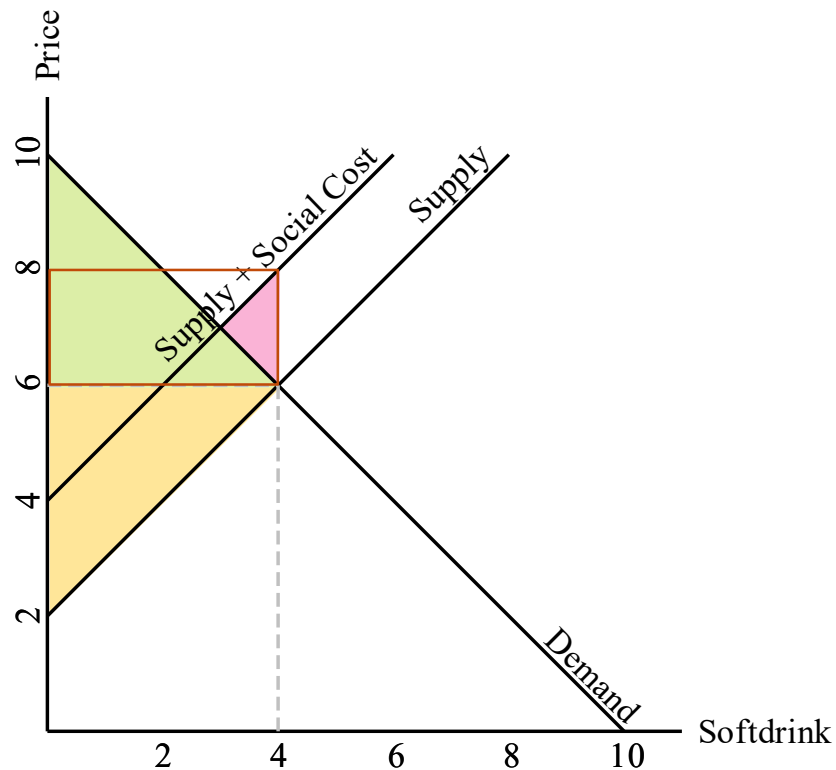
Welfare Analysis before Tax

- Price: 6

- Quantity: 4

Welfare		Value
Consumer Surplus ●		8
Producer Surplus ●		+8
Social Cost ○		-8
Total Welfare		8

SUGAR TAX

Supply and Demand after Tax
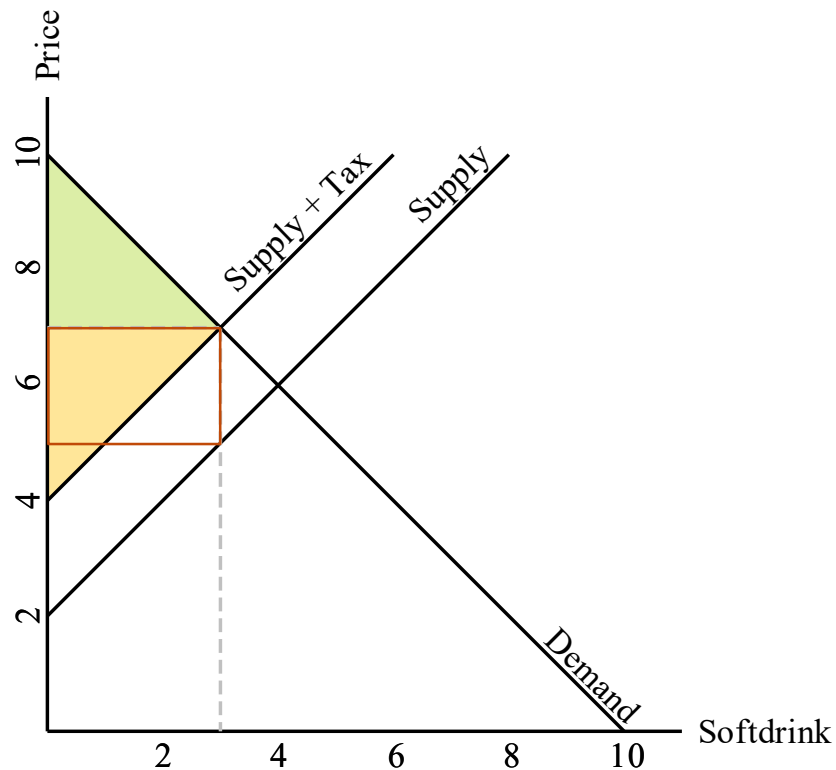
Welfare Analysis after Tax

- Price (Social Optimum): 7

- Quantity (Social Optimum): 3

| Welfare		Value
Consumer Surplus 🟢		4.5
Producer Surplus 🟡		+4.5
Total Tax Revenue ⭕		+6
Social Cost ⭕		-6
Total Welfare		9

MANAGING STABILIZATION

MANAGING STABILIZATION

- Stabilization is the last pillar of food security and often dropped.

- Yet, availability, access, and utilization can only be guaranteed if they are also stable over time (think of the problems arising from transitory or acute food security).

- This module discusses mechanisms to stabilize food supply shocks
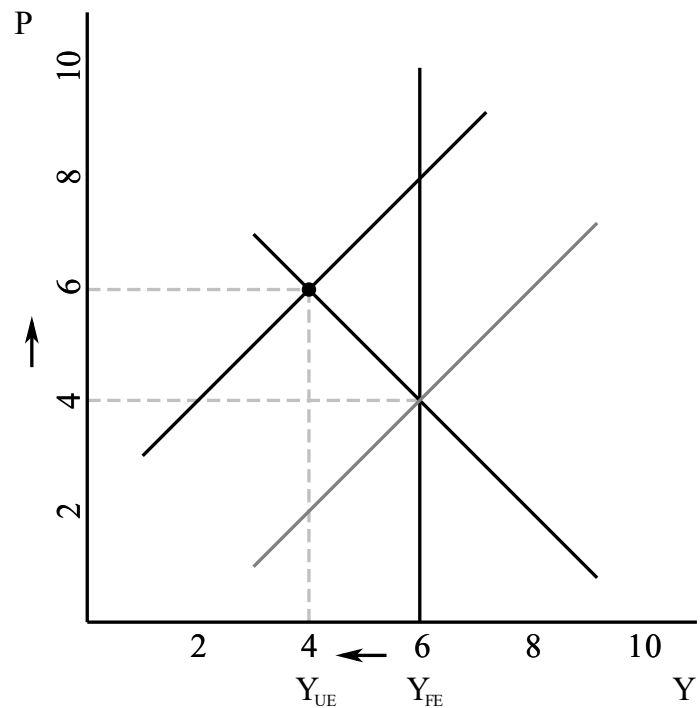
STABILIZING SUPPLY SHOCKS

Macroeconomic Full Employment Equilibrium
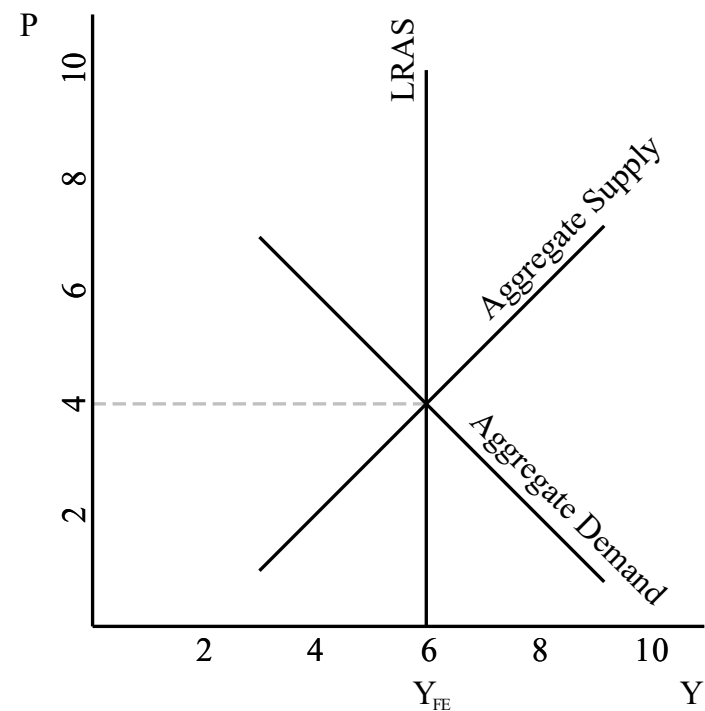
- Equilibrium Full Employment = 6
- Equilibrium Price Level = 4
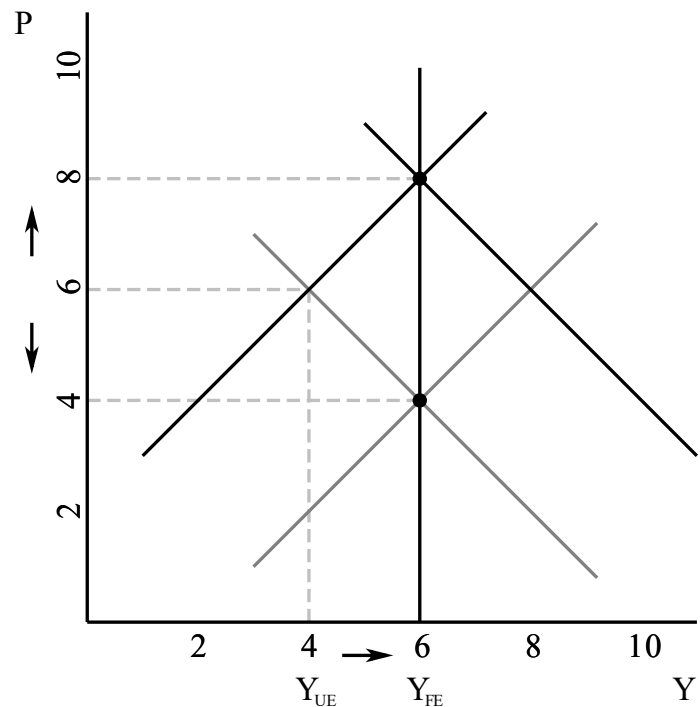
STABILIZING SUPPLY SHOCKS

Macroeconomic Supply Shock

- Example: Drought, natural disaster

- Underemployment Equilibrium =4

- Supply Shock induced increase in Price Level (Inflation) to P = 6

STABILIZING SUPPLY SHOCKS
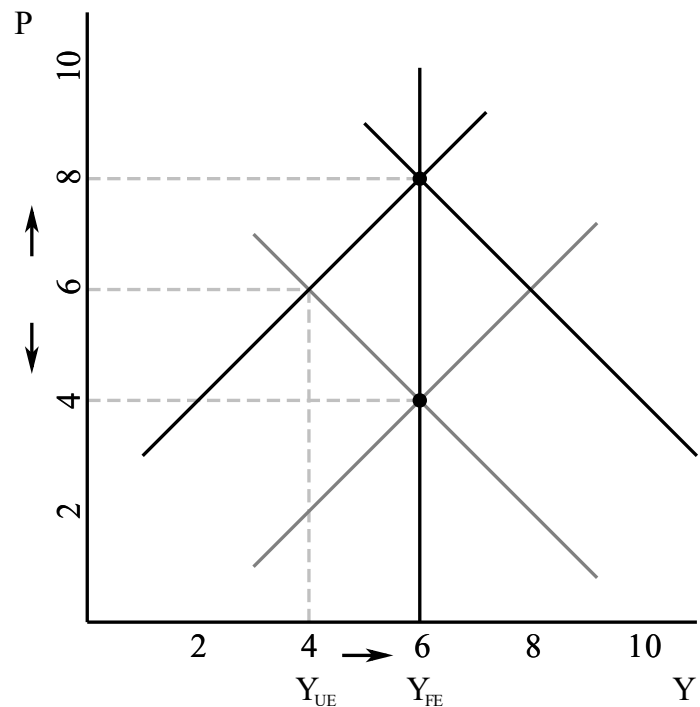
Policy Response Options and Dilemmas

Imagine a Farmer

Drought Scenario

- A drought destroys arable land but leaves capital intact:
  - Aggregate supply shifts to the left.
  - Excess capital results.

- Government response options: Fiscal Policy
  - Active labor market programs,
    Tax reductions,
    Government spending
  - Shifts aggregate demand to the right
  - Employment goes up, but at the expense of higher prices (basic macroeconomic trade-off between inflation and employment, Phillips Curve)

STABILIZING SUPPLY SHOCKS

Policy Response Options and Dilemmas

Imagine a Farmer

Drought Scenario

- A drought destroys arable land but leaves capital intact:
  - Aggregate supply shifts to the left.
  - Excess capital results.

- International Community option: Food Aid
  - Shifts aggregate supply to the right if, for example, aid makes economic activity more productive as a result of better health and social stability (no food riots).

STABILIZING SUPPLY SHOCKS

Policy Response Options and Dilemmas
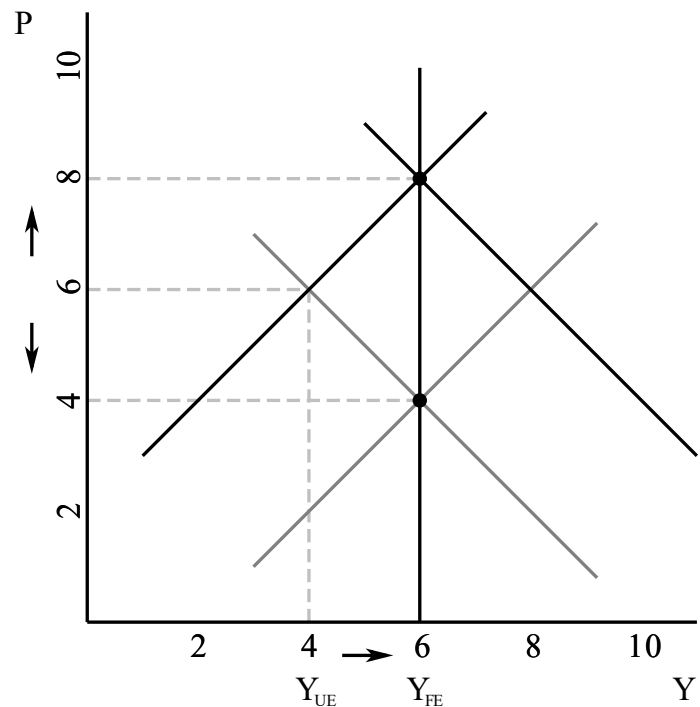
Imagine a Farmer

War Scenario

- A war destroys capital:
  - Aggregate supply shifts to the left.
  - Capital shortage results.

- Central bank options: Monetary Policy
  - Increase money supply to lower interest rates which stimulates domestic investment.
  - Shifts aggregate demand to the right.
  - Employment goes up, but at the expense of higher prices (basic macroeconomic trade-off between inflation and employment, Phillips Curve)

SUMMARY

- "It is argued that a strategy for attacking poverty in conjunction with policies to ensure food security offers the best hope of swiftly reducing mass poverty and hunger. However, recent studies show that economic growth alone will not take care of the problem of food security. What is needed is a combination of:
  - income growth; supported by
  - direct nutrition interventions; and
  - investment in health, water and education."

(FAO, 2008)

COMPLEMENTARY MATERIAL

- FAO (2005). The Right to Food. Voluntary Guidelines. FAO Rome.

- Varian, H. R. (2014). Intermediate microeconomics with calculus: a modern approach. WW Norton & Company.
  - Subsidies vs. cash transfer – Ch. 8 Slutsky Equation
  - Crop Insurance – Ch. 13 Uncertainty
  - School Feedings Programs and Sugar Tax – Ch. 34 Externalities

SELF-ASSESSMENT

- True or False Questions
- Multiple Choice Questions
- Cloze Questions

EXERCISE MODULES 4 & 5

- Consider an individual that maximizes
  - Cobb-Douglas Utility Function $\max U(x, y) = x^\alpha y^\beta$ $s.t.$ $M = P_x x + P_y y$.
  - Stone-Geary Utility Function $\max U(x, y) = (x - \bar{x})^\alpha (y - \bar{y})^\beta$ $s.t.$ $M = P_x x + P_y y$
  - Leontief utility function $\min U(U_1, U_2) = \min(\gamma x, y)$ $s.t.$ $M = P_x x + P_y y$
  - modified Leontief utility function $min U(U_1, U_2) = [\alpha(B + W), W + \beta]$ $s.t.$ $M = P_x x + P_y y$ with b>a>1

- For each of the above
  - Derive the Marshallian demand function for x and y (B and W).
  - Sketch a stylized indifference curve and budget constraint in the optimum.
  - Derive the relative expenditure share functions for x and y (B and W).
  - What kind of consumer behavior does the consumer choice problem describe?

SOURCES

CESCR, G. C. N. (1999). 12, The Right to Adequate Food (Art. 11). UN Doc. E/C, 12, 5.

FAO (2005). The Right to Food. Voluntary Guidelines. FAO Rome.

Spitz, P. (1985). The right to food in historical perspective. Food Policy, 10(4), 306-316.

Varian, H. R. (2014). Intermediate microeconomics with calculus: a modern approach. WW Norton & Company.