Aggregation

- Need to aggregate impacts across individuals
- Welfare Function: Aggregation of individual welfare functions.

Individual welfare function for i

$U_i = U_i(X_{i1}, X_{i2}, \ldots X_{ij})$

$\text{Max } L = U_i(X_{i1}, X_{i2}, \ldots X_{ij}) - \_i(p_1 * X_{i1} + p_2 * X_{i2} \ldots + p_j * X_{ij} - Y_i)$

FOC:

$\partial U_j / \partial X_{ij} = \_i * P_j$

$\partial U_j / \partial X_{ij} = \partial U_i / \partial Y_i * P_j$

$dU_i = \_j \, \partial U_i / \partial X_j \, dX_{ij} = \_j \, \partial U_i / \partial Y_i * P_j \, dX_{ij}$

Social Welfare Function

$W = W(U_1, U_2, U_3, \ldots U_n)$

$dW = \__i \; \partial W/\partial U_i \, dU_i$

$= \__j \__i \; \partial W/\partial U_i * \partial U_i/\partial Y * P_j \, dX_{ij}$

$= MSU_i * MU\ Income_i * Pj\ dX_{ij}$

MSU_i = Maginal Social Utility of individual i

$MU\ Income_i$ = Marginal utility of income for indivual i.

Kaldor – Hicks Compensation Tests

- Kaldor: The winners from a project can *in principal* compensate the losers
  - "CV"
- Hicks: The losers cannot bribe the potential winners *not to* undertake the project
  - "EV"
- Scitovsky: Both the Kaldor and Hicks criteria are met.

Kaldor – Hicks Compensation Tests

- These compensation tests assume:
  - $MSU_i = MSU_j$ for all i, j
  - MU_i Income = MU_j Income = k.
- A dollar has the same "value" (utility) for all individuals in society, no matter what their income level (or other characteristics).

Example from Zerbe & Dively *(pp. 102 -108)*

- Consider option to build an airport
- Impacts:
- Costs
  - If built, neighboring residents will suffer from increased noise
  - WTP to not have the airport built (EV)
  - WTA after airport is built (CV)
- Benefits
  - Airlines “gain” from airport (increased profits)

Example 1
Plan to build airport

	Residents	Airlines	Net Social Value
Airport built	-5000 WTA	+3000 WTP	-2000 Kaldor
Airport not built	+3500 WTP	-3000 WTA	+500 Hicks

WTP vs WTA

- Generally Expect WTP to avoid a negative change will be less than the WTA to accept the change.
- Why?
  - WTP is constrained by limited income
  - WTA is unconstrained
- For normal goods, price reduction will have positive income effect, price increase will have negative income effect

Question?

- Why would airlines (firms) have different WTP than WTA?
  - WTP should be equal to expected future profits
  - WTA should also be equal to expected future profits
- General point – always need to look at final impacts on ***consumers***

Alternative Formulation

- Rather than the “benefits” of the airlines, consider the benefits of building the airport to local residents who would be able to use the new airport:
  - Reduced (total) price of airline travel (including the price of travel to the nearest airport)

Example 1

	Residents	Airlines	Net Social Value
Airport built	-5000 WTA	+3000 WTP	-2000
Airport not built	+3500 WTP	-3000 WTA	+500

Example 1A

	Residents	Resident airline travelers	Net Social Value
No airport to airport	-5000 WTA	+2000 WTP	-3000
Airport to no airport	+3500 WTP	-3200 WTA	+300

Ambiguous Outcomes of Compensation Rules

Example 2

	Residents	Resident airline travelers	Net Social Value
No airport to airport	-5000 WTA	+2000 WTP	-3000
Airport to no airport	+3500 WTP	-4000 WTA	-500

Ambiguous Outcomes of Compensation Rules

- In this situation:
  - If airport does not exist, don't build it
  - If airport exists, do not get rid of it
- *"Tyranny of the Status Quo"*
- Also, depends on property rights.
  - Do residents have right to quiet. If so they do not have pay the passengers, but passengers must compensate the residents for noise created.
  - Property rights determines who has "standing" in the analysis, but ***not*** necessarily who ***should*** have standing