Economics 522: Law and Economics **Email: jebecker3@wisc.edu**
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Handout #1: Economic Efficiency

Review

1. Welfare Criteria

(a) Pareto

- A *Pareto improvement* is any change to the economy which leaves everyone at least as well off, and someone strictly better off.
- An outcome *A Pareto dominates* outcome B, if there is Pareto improvement for moving from B to A.
- An allocation is *Pareto efficient* if there exist no Pareto improvements upon it.

(b) Kaldor-Hicks

- A *Kaldor-Hicks (K-H) improvement* is any change to the economy which increases the total value achieved by everyone in society. That is, a K-H improvement is a change that could be turned into a Pareto improvement by adding a set of monetary transfers.
- An outcome *A K-H dominates* outcome B, if there is K-H improvement for moving from B to A.
- An allocation is *K-H efficient* if there exist no K-H improvements upon it.

(c) Alternative Criteria
These are by no means the only welfare tests in the history of economic thought. Any book on Welfare Economics or Social Choice theory will explore these tests in more depth.

2. Pareto vs K-H

- A Pareto improvement implies a K-H improvement. But a K-H improvement doesn't imply a Pareto improvement.
- K-H efficiency implies Pareto efficiency, and when we allow transfers Pareto efficiency implies K-H efficiency.
- There is a sense in which checking for K-H improvements is more *informationally-demanding* than checking for Pareto improvements. After some change, a Pareto improvement requires a "thumbs-up" from all parties, but a K-H improvement requires that we know *how much* better- or worse-off all parties are.

3. Some "factors" that might lead to inefficiency:

- Non-competitive markets (monopoly or monopsony power).
- Public good and externalities.
- Private information.
- Government intervention.

Note: In the Pareto sense, inefficiencies arise when mutually beneficial exchanges don't occur. In the Kaldor-Hicks sense, inefficiencies arise when there exists untapped potential to make a change where net-benefits outweigh net-costs.

Discussion: Why Kaldor-Hicks?

In lecture we mentioned that Pareto improvements are hard to come by, but there may be numerous changes which are K-H improvements. However, to modify an objection that was stated nicely by Nobel Prize-winning economist Amartya Sen, one might ask whether K-H improvements are *actually* substantially more common than Pareto improvements. After all, if a K-H improvement could be made Pareto given monetary transfers, couldn't we just perform the transfers to get a Pareto improvement? Why entertain the mere *possibility* of compensation when *requiring* compensation could make everyone better off?[1]

What do you think?

[1]The original argument from Sen is a bit more complicated, and he makes a distributional critique of Kaldor-Hicks tests. I've modified it to be more relevant to this course. For the full discussion, you can see: Sen, Amartya. 1979b. "The Welfare Basis of Real Income Comparisons: A Survey." Journal of Economic Literature 17:1–45.

Problems

1. You have a used car that you want to sell. Three of your neighbors have expressed interests in your car. The valuations for the car are as follows:

	You	Neighbor A	Neighbor B	Neighbor C
Valuation	\$5000	\$4000	\$6000	\$8000

Which of the following are Pareto improvements? Which are Kaldor-Hicks improvements?

(a) You sell your car to neighbor A at the price of \$6000.

(b) You sell your car to neighbor B at the price of \$6000.

(c) You sell your car to neighbor B at the price of \$7000. Neighbor B then sells the car to neighbor C at the price of \$7500.

(d) You sell your car to neighbor C at the price of \$7000. To finish the transaction, neighbor C must pay the DMV a fee of \$2000.

2. This problem was adapted from a famous anti-consequentialist argument from T.M. Scanlon:[2]

"Suppose that Jones has suffered an accident in the transmitter room of a television station. Electrical equipment has fallen on his arm, and we cannot rescue him without turning off the transmitter for fifteen minutes. A World Cup match is in progress, watched by many people, and it will not be over for an hour. Jones's injury will not get any worse if we wait, but his hand has been mashed and he is receiving extremely painful electrical shocks. Should we rescue him now or wait until the match is over?"

To determine the economically efficient outcome, we must assign a specific willingness-to-pay to each affected agent. Suppose Jones is willing to pay $10 \cdot m^2$ dollars to receive medical attention m minutes before the end of the match.

Now suppose there are $10,000$ people watching the game. 1000 of the poorest viewers get \$1 in surplus value from watching the match uninterrupted, 1000 get \$2 in value, and so on, so that the richest 1000 viewers get \$10 in surplus value from watching the match uninterrupted. If the transmission is cut before the end of the match, viewers lose all surplus value from watching the match.

(a) If there are sixty minutes left in the game, what is Jones's total willingness-to-pay to turn off the transmitter now (with $m = 60$)? What is the sum total of the viewers' willingness to pay to keep the transmitter on? Which course of action is economically efficient?

(b) Characterize the entire set of economically efficient outcomes. That is to say, what combinations of decisions (cut transmission now, don't cut transmission) and monetary transfers result are efficient in the Kaldor-Hicks sense?

(c) Suppose that the transmitter is left on, but that the TV station wants to collect money from viewers to compensate Jones for the shocks he received. What amounts can the TV station collect from each viewer to make the final outcome a Pareto improvement upon the *hypothetical* outcome where the transmission is cut and where viewers are not compensated?

Suppose now that the there was a golf tournament happening the same day as the World Cup game, and the richest 3000 World Cup viewers (those willing to pay \$8, \$9, and \$10) decide to watch golf on a second screen, and they now get \$0 in surplus value from watching the World Cup match.

(d) How do your answers to (a) and (b) change from the original example?

(e) Do you find this analysis satisfactory?

3. Two students form a team to work on a class project. Each student could choose to either to work like crazy (W), or to slack off (S). The payoff table is as follows:

[2] T. M. Scanlon, *What We Owe to Each Other* (Cambridge, Mass.: Harvard University Press, 1998)

	S	W
S	1, 1	6, -1
W	-1, 6	2, 2

(a) Find the Nash equilibrium/equilibria.

(b) Which outcomes are Pareto efficient? Which outcomes are Kaldor-Hicks efficient?

4. There are N cars in the city and two roads. From the perspective of each car user, it takes 105 minutes to traverse road A and $(5 + 20X)$ minutes to traverse road B, where X is the number of cars currently in the road.

(a) What is the equilibrium number of cars on each road?

(b) What is the Kaldor-Hicks efficient number of cars on each road? Is it Pareto efficient? Is it a Pareto improvement from the equilibrium outcome?