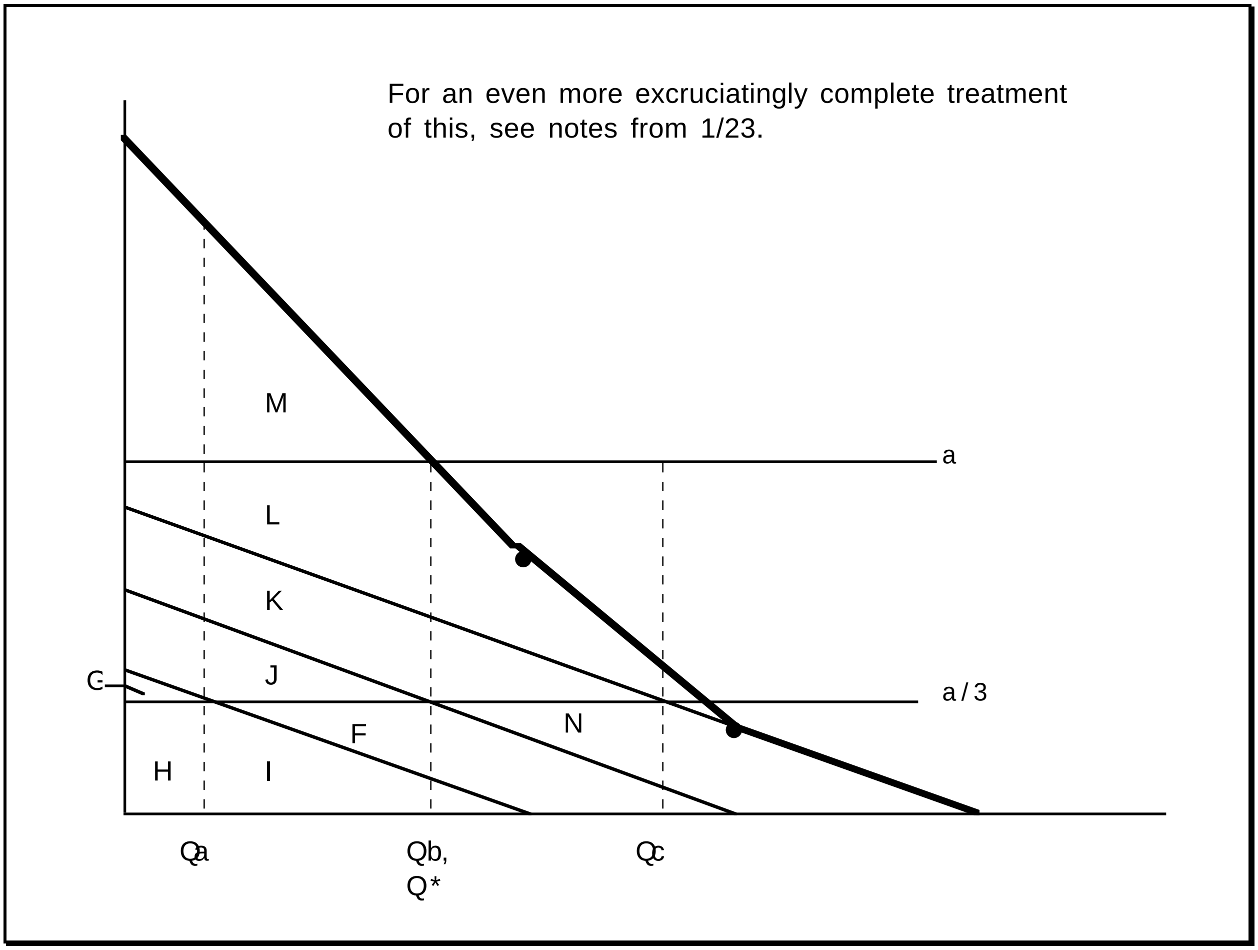
Back to Kaldor-Hicks: If the losers *could* be compensated for their losses by the winners *and* at least one winner would still be better off, the K-H test is passed. If that compensation is *actually* made, the move is also Pareto efficient.

Example:




Here, we have three consumers with parallel demands, but different levels of demand.
First, find the vertical sum of the demands across all relevant ranges of Q. To find the optimal level of Q for society (Q*), find the point where MC = MBS.

If there is no collective action in this economy for this good and MC = a, none will be produced because the marginal cost (price) is higher even than the highest level of demand. If the group gets together, forms a collective (government or less formal joint group), and decides to purchase some of this good, the collective should purchase a level of Q that maximizes the net gain to society. That level is Q*, the quantity indicated at the intersection of MC and MBS.

Why is this so?

The marginal cost and MBS curves are found by adding individual demands together. Because of this, the area under the MBS curve and above the MC curve is the sum of all the individual gains and losses.

Here, the net gains and losses of A, B, and C in the move from Qa to Qb (which in this case happens to be Q*) are:

A: -F

B: J

+ C: J + K

2J + K - F. But how do we know that this is a net positive?

In the move from Qa to Qb, MBS > MC; that is, benefits are greater than costs and the net sum is positive. Therefore, 2J + K - F is certainly positive if it equals area M. Let's find out whether it does.

We assert that the sum of gains (benefits) and losses (costs) of individuals equal the sum of gains and losses of society.

Σ costs & benefits of society = Σ costs & benefits of A, B, & C

(benes)-(costs) = (A benes-costs)+(B benes-costs)+(C benes-costs)

(I+F+J+K+L+M)-( I+F+J+K+L) = [I-(I+F)]+[(I+F+J)-(I+F)]+[(I+F+J+K)-(I+F)]

**M = 2J+K-F**

We reach the same conclusion if we simply compare the areas under the curves all the way down to the x axis. The first step is realizing that, by definition,

$3(MC/3) \equiv MC \longrightarrow 3(I+F) \equiv (I+F+J+K+L) \longrightarrow 3I+3F \equiv I+F+J+K+L$

Area under MBS = Σ Areas under A, B, and C

(I+F+J+K+L+M) = I+(I+F+J)+(I+F+J+K)

3(I+F)+M = I + (I+F+J)+(I+F+J+K)

3I+3F+M = 3I+2F+2J+K

F+M = 2J+K

**M=2J+K-F**

∴ we've established that the move from Qa to Qb (Q*) satisfies the K-H test, because the sum of the gains and losses is positive and compensation is theoretically possible. If payments are made, the move is Pareto efficient.

Generally speaking, all points where MBS ≥ MC are solutions that pass the K-H test and, if compensating side payments are made, are also Pareto efficient All points between zero and Q* meet this definition, so a move rightward to any point up to Q* passes the K-H test. If compensating side payments are actually made, such a move is also Pareto efficient.
If side payments are not necessary, the move is *Pareto preferred* (in our example everyone wins and no-one loses in a move from zero to Qa, so across that range side payments are not required).

<u>Note that compensating merely changes who bears the loss; it doesn't change the total social benefit of the move</u>.

Q: If the majority desires a change, is it socially optimal <u>by definition</u>?
In the case we've described above, B and C would vote for Q*; A would not, but 2/3 majority wins and we'd get Q*.

Generally speaking, in a series of votes on various levels of Q, society will move toward the median level of Q. To show this, let's look at individual preferences.

Preferences

| A | B | C |
|---|---|---|
| Qa | Qb | Qc |
| Qb | Qa=Qc | Qb |
| Qc | Qa=Qc | Qa |

Note that B is indifferent between Qa and Qc because all the demands in this system are parallel and equidistant, so triangles J (benefit foregone if we remain at Qa) and K (cost imposed if we move to Qc) are the same size and are equally negative outcomes for B.

Given the above preferences, what happens in a series of elections?

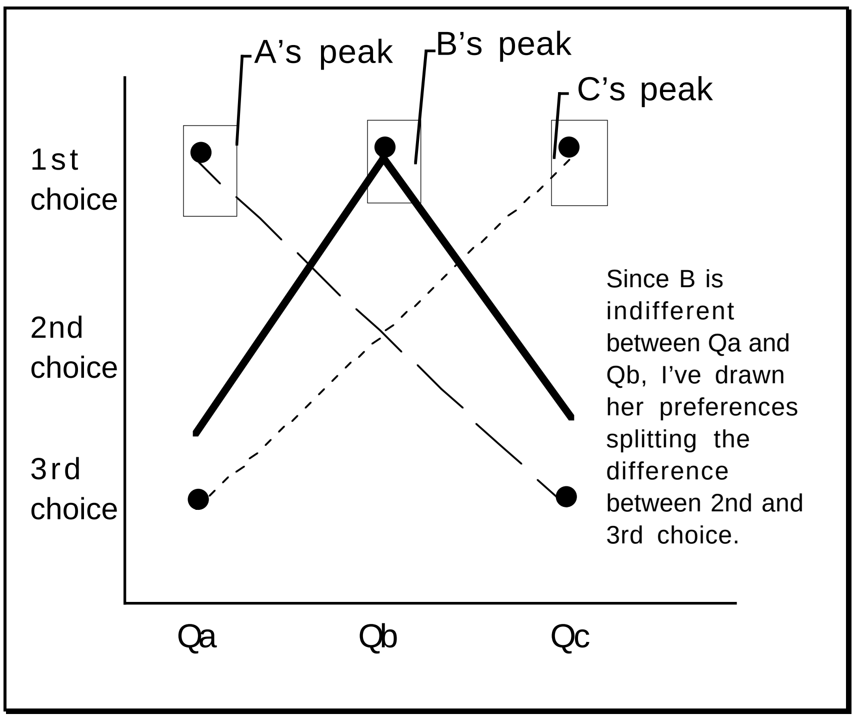
Qa v. Qb → Qb (A votes for Qa, B & C vote for Qb)
Qa v. Qc → indeterminate (depends on what B chooses)
Qb v. Qc → Qb

∴ majority rule leads us to the median outcome Qb. This is a general rule: the **median voter** (in this case, B) controls the outcome of the series of elections. In this case, Qb = Q*, so we arrive at Q*.

This rule depends on a few things:

1. single-peaked preferences (where utility consistently falls away from the preferred outcome)

2. one-dimensional variable (a yes or no answer to a single question: no confounding factors)




If we graph the preferences, we can see the peaks.

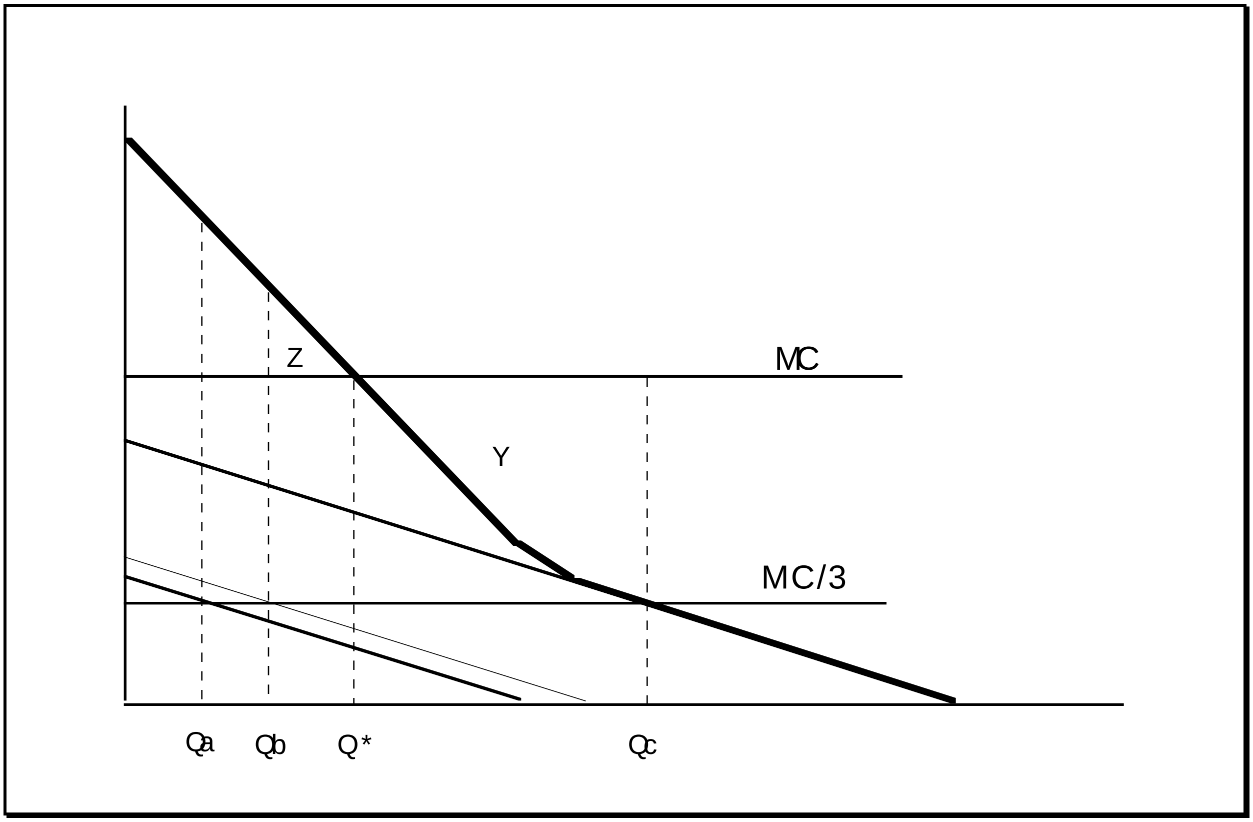
In terms of preference,

for A, Qa > Qb > Qc

for B, Qa < Qb > Qc

for C, Qa < Qb < Qc.

"Single-peaked" means that utility consistently when moving away from the preference point.




We do not reach Q* by majority vote unless Q*=median voter's preference.

In this graph, demands are not symmetrical. Q* no longer meshes with Qb. ∴ the median voter outcome and the voting mechanism for making public choice will not necessarily arrive at the socially optimal solution.

Again assuming single peaks, even if all 4 options were voted for, Qb would win:

| **VOTES** | **Qa** | **Qb** | **Q *** | **Qc** |
|---|---|---|---|---|
| Qa v. **Qb** | A | **B, C** | XXX | XXX |
| **Qa** v. Q* | **A, B** | XXX | C | XXX |
| **Qa** v. Qc | **A, B** | XXX | XXX | C |
| **Qb** v. Q* | XXX | **A, B** | C | XXX |
| **Qb** v. Qc | XXX | **A, B** | XXX | C |
| **Qc** v. Q* | XXX | XXX | **A, B** | C |

Note that B is not indifferent between Q* and Qa; in this example, Qa is closer than Qb and so B's loss is less at Qa. Note also that even if B were indifferent, it would have no effect on the ultimate outcome.

Moving from Q* to Qb cannot be a K-H winner, because C loses more (triangle Z = benefits foregone) than the others gain.
The general rule is that wherever MBS > MC, a move to the right is a K-H winner; a move to the left is a K-H loser.

Note that the size of triangle Z equals the amount that C has left over after bribing A and B to vote for Q* as opposed to Qb. Of course, the problem is that in many cases bribes and collective action are illegal.

Triangle Y is the loss that society would bear if it produced at Qc.

Problems of truthfulness: If people know they're going to get side payments/pay side payments, they have an incentive to lie about their preferences. How, then, can we ever get to Q*?

<u>Ways of getting Q*</u>:

<u>Clarke taxes</u>: ask people to quantify the extent of their preferences without knowing they'll be paying taxes. However, the taxes don't go to the individuals. You have winners pay an amount equal to the loss of the losers as they reported it. Losers have no incentive to inflate because they don't get the money. This is <u>not</u> a real-world solution.

<u>Logrolling</u>: trading votes. A wants C to vote with him on issue a, so offers to do so in return for C voting with A on an issue in the future. This allows those with strong preferences to express them by convincing people without strong preferences to vote their way and thus increasing the power of their vote.

<u>Filibuster</u>: C might filibuster and make things really painful for A and B until they give in. This is an inferior method as compared to logrolling because it expends a lot more resources than the others.