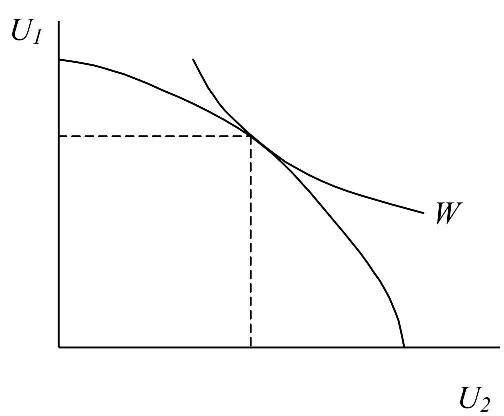
Chapter 1
Introductory Concepts

Efficiency Concepts

The predominant efficiency concept in economics is *Pareto optimality* (or Pareto efficiency). To illustrate this concept, consider a two-person economy consisting of individuals whose utility functions over wealth are given by $U_1(w_1(x))$ and $U_2(w_2(x))$. Here x is a legal rule that affects the allocation of resources (e.g., the rule for assigning liability in accident cases).

The Pareto optimal outcome is found by choosing x to maximize U_A subject to the constraint that $U_2 \geq U_2^0$ for some arbitrarily chosen U_2^0. The solution to this problem for different values of U_2^0 traces out the *utility possibility frontier* (UPF) (see Figure 1.1 in the text). All Pareto optimal allocations must be on this frontier (otherwise, one individual's utility can be raised without lowering the other's).

One way to resolve the non-comparability problem with Pareto is to define a *social welfare function*, $W(U_1, U_2)$, whose arguments are the utility levels of all individuals in the economy. The social problem is then to choose x to maximize $W(U_1, U_2)$ subject to the UPF, as shown below.



This solution does not really resolve the problem because it begs the question of where the weights attached to the individual utilities in W come from.

Another approach for overcoming the non-comparability problem is to ask whether the gainers from a reallocation (change in x) would be able to fully compensate the losers and remain at least as well off. Such a reallocation is efficient in a Kaldor-Hicks sense if the answer is yes, *even though compensation is not actually paid* (if it were, the change would be a Pareto improvement).

Kaldor-Hicks efficiency is equivalent to *wealth maximization*. (For discrete changes, it amounts to cost-benefit analysis). To see the equivalence, let T be a transfer payment from person 1 to person 2. (If $T<0$, it is a payment from 2 to 1.) Now write the social problem as

$$\text{Max } U_1(w_1(x)-T) \text{ subject to } U_2(w_2(x)+T) \geq U_2^0$$

The first-order conditions for x and T are

$$U_1'(\partial w_1/\partial x) + \lambda U_2'(\partial w_2/\partial x) = 0 \tag{1.1}$$

$$-U_1' + \lambda U_2' = 0 \tag{1.2}$$

where λ is the Lagrange multiplier. Substituting (1.2) into (1.1) yields

$$\partial w_1/\partial x + \partial w_2/\partial x = 0 \tag{1.3}$$

which is the condition for choosing x to maximize w_1+w_2.

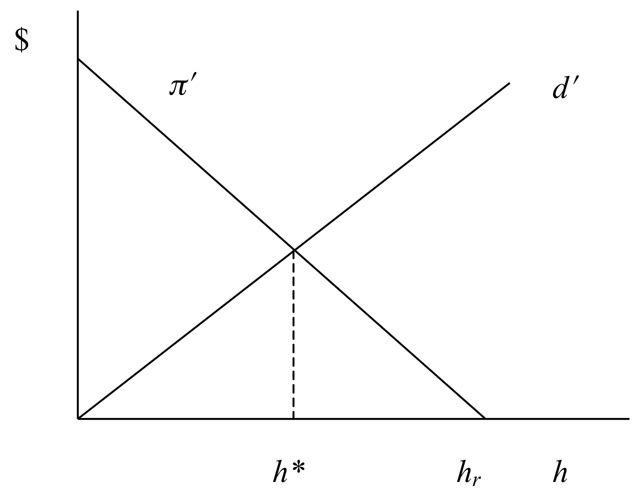
The Coase Theorem

Consider a farmer and rancher who occupy adjoining parcels of land. The rancher's profit depends on his herd size, $\pi(h)$, where h_r, the profit-maximizing size, solves $\pi'=0$. (Assume $\pi''<0$, implying decreasing marginal benefits.)

Cattle from the rancher's herd sometimes stray onto the farmer's land causing crop damage, $d(h)$, which is increasing in the herd size, $d'>0$. (Assume $d''>0$, implying increasing marginal costs.) The socially optimal herd size, h^*, maximizes $\pi(h)-d(h)$. h^*, therefore, solves $\pi'(h)=d'(h)$. It follows that $h_r>h^*$, as shown in the graph below.

If the rancher is taxed or faces liability for crop damage, he will internalize the farmer's loss and choose h^*. However, if he faces no liability, it is generally assumed that he will ignore the farmer's loss and choose h_r.

Coase argued, however, that if the farmer and rancher can bargain, the farmer will pay up to d', his marginal loss, for each steer the rancher removes from his herd, and the rancher will accept any amount greater than π', his marginal benefit, to reduce his herd by one. A bargain is therefore feasible as long as $d'\geq\pi'$, which is exactly the range where the herd is too large. Bargaining, therefore, achieves the efficient herd size.



$
π′
d′
h*
h_r
h