

# PRICE THEORY AND APPLICATIONS

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THIRD EDITION  
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## Example: A Military Draft.

Society, through its armed forces, demands military services that are supplied by young people between the ages of 18 and 26. Suppose that the armed forces are able to set a maximum price (below equilibrium) that they will pay for military services, and suppose that they can *compel* young people to supply the quantity of military services that is demanded at that price ( $Q_d$  in Exhibit 9-4). The "Draft" column of the table in Exhibit 9-4 shows the distribution of gains; the "Volunteer Army" column shows the gains in equilibrium for comparison.<sup>12</sup>

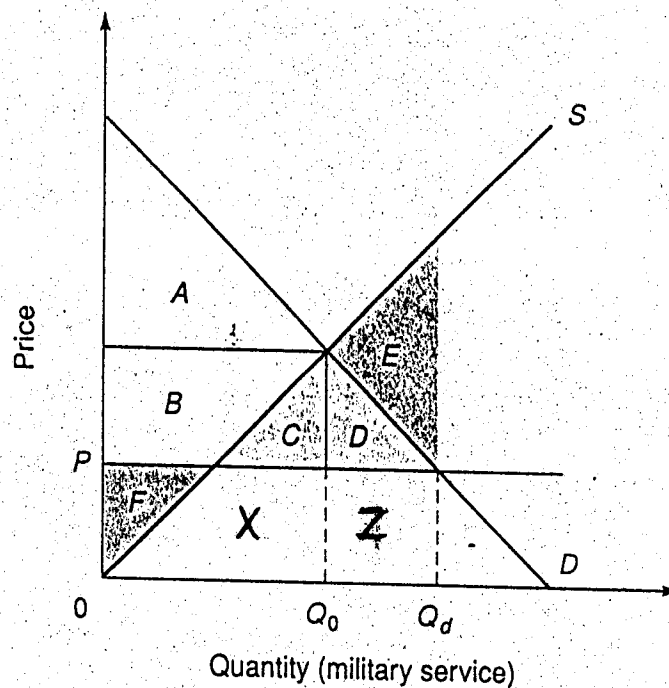
Exhibit 9-5 elaborates on the reason why the producers' surplus is  $F - C - D - E$  in the presence of a draft. Panel A of Exhibit 9-5 reproduces the relevant part of the graph in Exhibit 9-4. Revenue to producers (that is, the wages paid to soldiers) is given by price times quantity, that is, the rectangle  $X + Z$ . The sum of the marginal costs to producers is the sum of the rectangles in panel B, which is the same as area  $Y + Z$  in panel A. The difference is  $(X + Z) - (Y + Z) = X - Y$ , which is the same as  $F - C - D - E$  in Exhibit 9-4.

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<sup>12</sup>By drawing one graph, we are implicitly assuming that all young people would make equally good soldiers. To dispense with this assumption, we could draw several graphs, each showing the demand for soldiers of a different level of quality. None of our conclusions would be substantially altered.

## ♦ Exhibit 9-4 A Military Draft

	Volunteer Army	Draft	Limited Draft
Consumers' Surplus	$A$	$A + B + C + D$	$A + B + C$
Producers' Surplus	$B + F$	$F - C - D - E$	$F - C$
Social Gain	$A + B + F$	$A + B + F - E$	$A + B + F$
Deadweight Loss	—	$E$	—



Military services are supplied by young people and demanded by society through the armed forces. The first column shows the gains at equilibrium, with a volunteer army. We assume that the wage rate is set at  $P$ , so that more young people are demanded than will volunteer. If the army can draft as many young people as it wants to at the price  $P$ , it will choose the quantity  $Q_d$  and social gains will be as depicted in the second column. If, on the other hand, the army is permitted to hire only  $Q_0$  young people, social gains will be as in the third column, seemingly eliminating the deadweight loss. This leads to the apparent conclusion that the limited draft is as efficient as the volunteer army. As explained in the text, however, this conclusion is misleading.

- **Exercise 9.5** Verify the deadweight loss in Exhibit 9-4 by calculating social gain directly (that is, using rectangles representing marginal value minus marginal cost, without breaking things down into consumers' and producers' surpluses).

Now consider an alternative policy. Suppose that at the same controlled price  $P$ , the armed forces can compel services only from that number of young

## FURTHER COMMENTARY ON EXHIBIT 9-4 BY U.E.R.:

I have modified Exhibit 9-4 a bit, by adding the labels X and Z in the graph.

The welfare accounting framework in Exhibit 9-4 takes the "Volunteer Army" as a baseline and then asks how "consumers' (taxpayers') surplus" and "producers' (the soldiers') surplus" are changed and redistributed as a result in instituting the draft.

In the baseline, with a voluntary army of  $Q_0$  soldiers, taxpayers pay  $Q_0$  soldiers  $B+C+F+X$ . The total benefit taxpayers derive from hiring  $Q_0$  soldiers is  $A+B+C+F+X$ , i.e., the area under the demand curve up to  $Q_0$ . Thus the net psychic profit (i.e., "consumers' surplus") that taxpayers derive from this deal is area A.

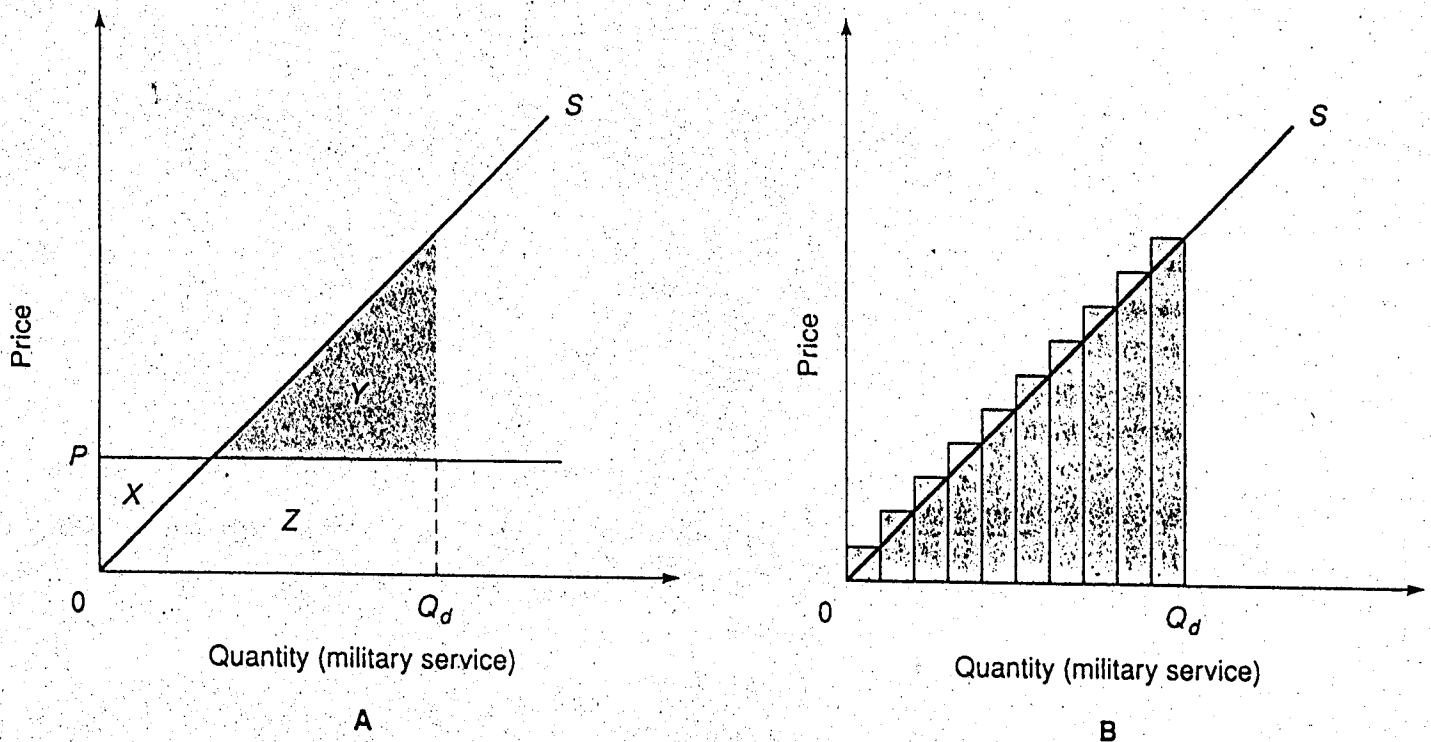
The opportunity costs borne by the volunteer soldiers is measured by the area under the supply curve from 0 to  $Q_0$ . It is the sum of areas  $X+C$ . As soldiers get paid  $B+C+F+X$ , they reap a "producers' surplus" of  $F+B$ . Total net social welfare under this deal is the sum  $A+B+F$ . This is the baseline situation.

After the draft, taxpayers pay soldiers  $F+X+Z$ , and they reap a total benefit from hiring  $Q_d$  soldiers at the low wage  $P$  equal to  $A+B+C+D+F+X+Z$ . Thus the taxpayers' net psychic profit ("consumer surplus") now is  $A+B+C+D$ . Alas for the previously hired soldiers who had volunteered for military service, they now get paid only  $F+X$  (rather than the previous amount  $B+C+F+X$ ). Thus they lose pay equal to areas  $B+C$ , which is transferred directly to taxpayers in the form of lower taxes. It is a transfer on which one might have varying views. Some taxpayers might view it as a nice windfall gain. Other citizens might view it as an untoward exploitation of fellow citizens. Using their collectivist approach to public policy, however, economists would score this transfer of economic privilege as a zero change in social welfare, because every dollar taken away from the soldiers now accrues to the taxpayers, so that social welfare (as economists think of it) has not changed at all. How do you feel about that normative proposition? Do you agree with economists that nothing of substance has changed with this transfer of wealth from soldiers to taxpayers?

But an additional  $Q_0-Q_d$  soldiers now are drafted at the low wage  $P$ . They are paid an amount equal to area  $Z$  in the graph. Their opportunity cost of delivering military service to society can be measured by the area under the supply curve over the range  $Q_0$  to  $Q_d$ . That total opportunity cost is the sum of areas  $Z+D+E$ . These draftees, then, suffer a loss equal to  $D+E$ . Of this loss, area  $D$  is transferred to taxpayers, who get these soldiers at below market pay. Once again, on their collectivist doctrine, economists would not score that transfer as a change in social welfare because what one member of society loses another gains.

But area  $E$ , a loss to "producers" (draftees), is not transferred to anyone else in society. It goes straight to the Devil, so to speak. Economists therefore would score area  $E$  as a loss to society as a whole, as a decline in "social welfare," or, in technical jargon, as a "deadweight loss." Economists do have strong misgivings about this deadweight loss.

♦ Exhibit 9-5 Computing Producers' Surplus with a Draft



If the army forcibly hires  $Q_d$  soldiers at the price  $P$ , then soldiers will earn  $P \cdot Q_d = X + Z$  in wages. Their opportunity cost of being in the army is the sum of all the rectangles in panel B, which is the same as area  $Y + Z$  in panel A. This leaves a producers' surplus of  $(X + Z) - (Y + Z) = X - Y$ .

people who would have enlisted voluntarily at the equilibrium price. In Exhibit 9-4 the number of soldiers is  $Q_0$  and the social gains are computed in the "Limited Draft" column of the table. Notice that the measured deadweight loss becomes zero.

- **Exercise 9.6** Verify all of the entries in the "Limited Draft" column of the table. Recompute the deadweight loss by a different method and make sure the answers coincide.

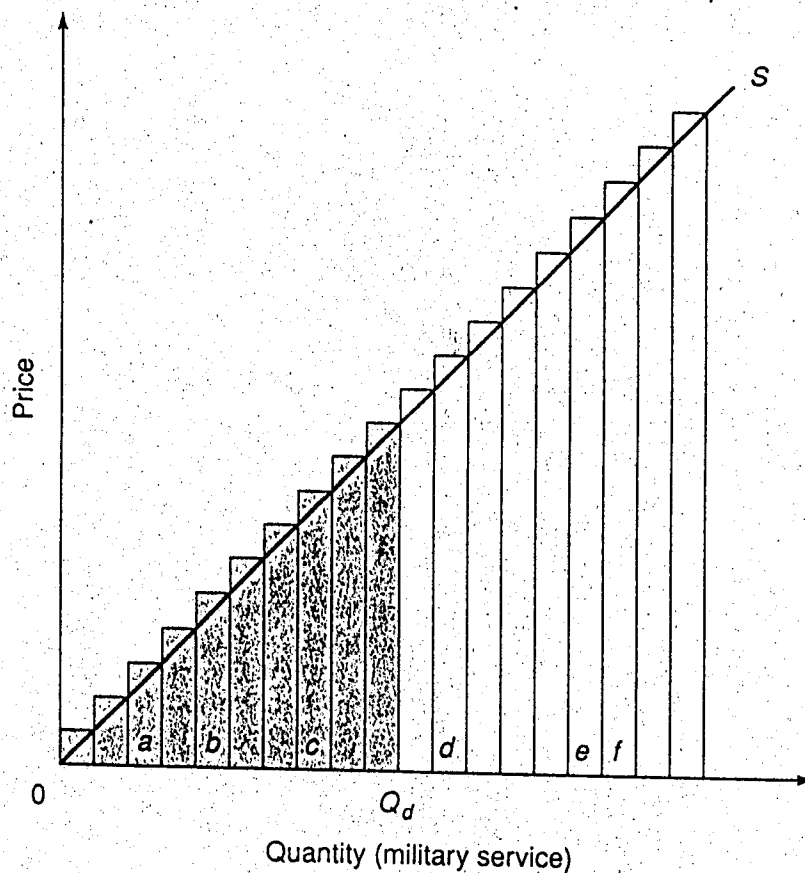
Notice that, compared with the volunteer army, the new "limited" version of the draft transfers the amount  $B + C$  from young people to the other members of society.

- **Exercise 9.7** Give an economic interpretation of the area  $B + C$  in Exhibit 9-4.

Now we are closing in on the main point: Even though the computed deadweight loss is zero, the limited draft is still inferior to the volunteer army from the point of view of economic efficiency. There are social costs associated with the draft that are not captured in our representation of deadweight loss.

Consider the calculation of producers' surplus, which is illustrated anew in Exhibit 9-6. We begin with the total revenue of soldiers and subtract from it the sum of the shaded rectangles. These rectangles are the costs of joining the army for the  $Q_0$  young people who would volunteer at the equilibrium price. But it is unlikely that these are the same young people who are drafted.

♦ Exhibit 9-6 Underestimating Deadweight Loss



$Q_0$  is the number of young people who would join a volunteer army. Each of these young people has an opportunity cost of joining that is represented by one of the shaded rectangles. When we compute producers' surplus, we take the total revenue earned by young people and subtract this shaded area.

Under a limited draft, the same number of young people enter the army. However, those who are drafted are not identical to those who would have volunteered. Suppose that the draft board selects the young people represented by rectangles  $d$ ,  $e$ , and  $f$  instead of rectangles  $a$ ,  $b$ , and  $c$ . In that case, social welfare is reduced by the area  $(d + e + f) - (a + b + c)$ , even though this reduction is ignored in the usual welfare computations. Hence the measured deadweight loss is overly optimistic.

Instead of drafting the young people represented by rectangles  $a$ ,  $b$ , and  $c$ , the authorities may draft those represented by rectangles  $d$ ,  $e$ , and  $f$ . The true producers' surplus is reduced by the area  $(d + e + f) - (a + b + c)$ . The measured producers' surplus, and consequently the measured deadweight loss, are too optimistic.

In concrete terms, what this means is that the Selective Service Board will draft young people who are potentially brilliant brain surgeons, inventors, and economists—young people with high opportunity costs of entering the service—and will leave undrafted some young people with much lower opportunity costs. The social loss is avoided under a voluntary system, in which precisely those with the lowest costs will volunteer.

What if the authorities choose to draft only the low-cost young people? Here, of course, the problem of knowledge becomes insurmountable. Information about individual opportunity costs, available for free under a voluntary system, is available only at high cost and with great uncertainty in the absence of prices. The Selective Service authorities can pass out questionnaires—but who will freely reveal that his costs are low? They can observe people's behavior—but who can observe the difference between two starving novelists in garrets; one with a brilliant vision that needs only careful nurturing to become great literature, the other barren of ideas, frustrated, and ready to quit?

It is often argued that the draft is better for society than a volunteer army because it is less costly. This argument is wrong.<sup>13</sup> The cost of maintaining an army is the sum of the opportunity costs of its soldiers and is independent of the wages paid to those soldiers. Higher wages mean less wealth for taxpayers and more for soldiers, but no more or less for society, to which taxpayers and soldiers equally belong. There are two ways in which an army can be unnecessarily costly: It can be the wrong size or it can consist of the wrong people. Exhibits 9-4 and 9-6 illustrate these two mistakes.