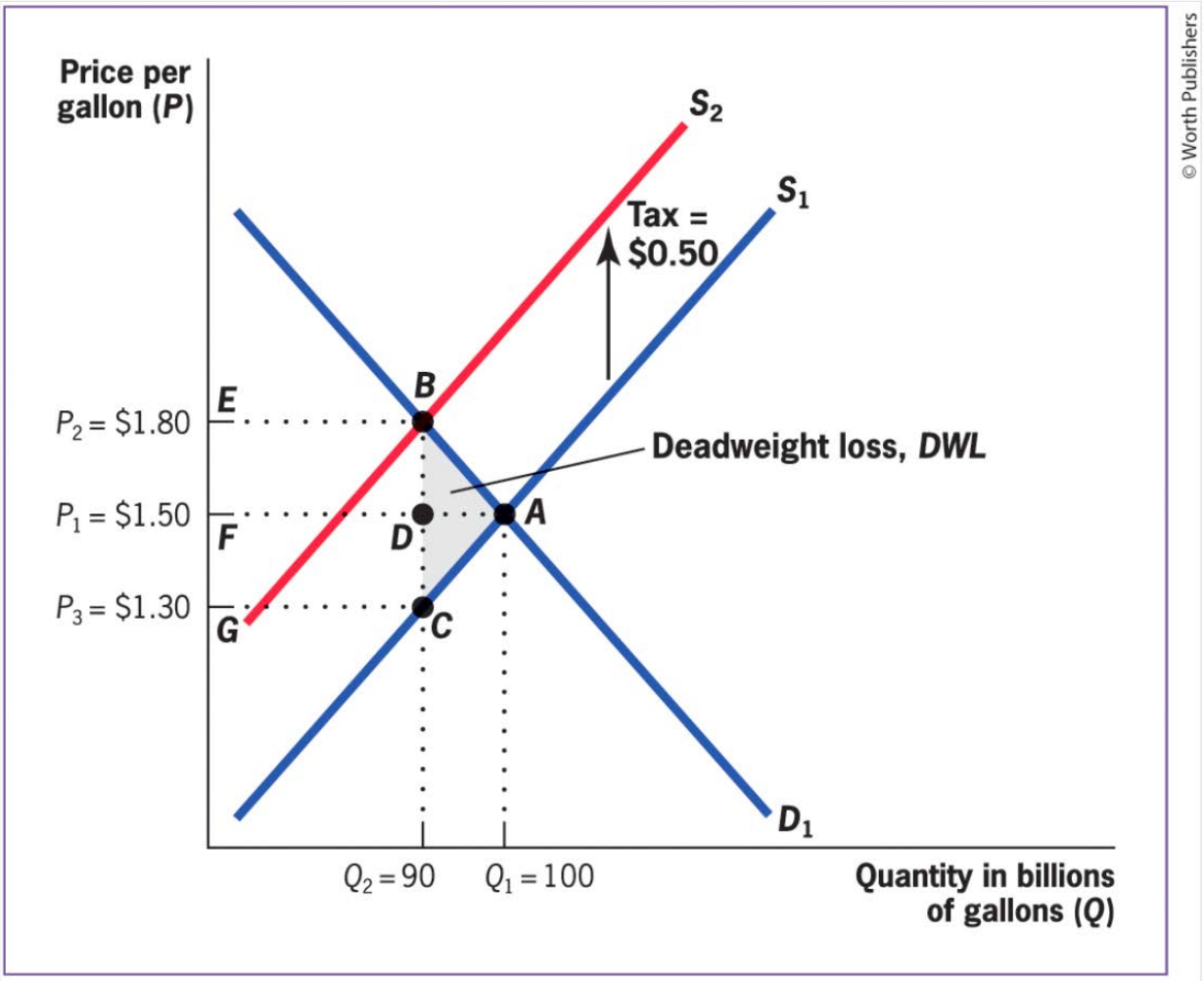

FIGURE 20-1 Deadweight Loss of a Tax • When a tax is imposed, the supply curve shifts from S_1 to S_2, and the equilibrium quantity in the market falls from Q_1 to Q_2, creating a deadweight loss triangle *BAC*. The *DWL* arises because there are trades $(Q_1 - Q_2)$ for which social marginal benefits (demand curve) exceed social marginal costs (supply curve) that are not made.

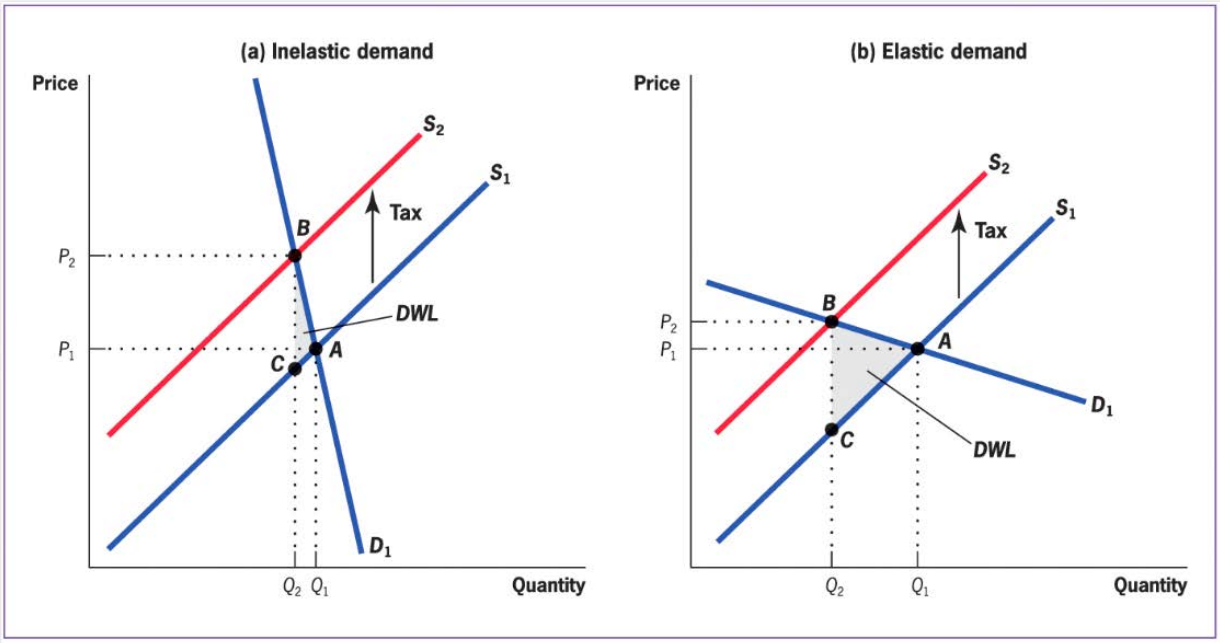

FIGURE 20-2 Deadweight Loss Rises with Elasticities • The deadweight loss of a given tax is smaller when the demand curve is less elastic, as in panel (a), than when it is more elastic, as in panel (b).

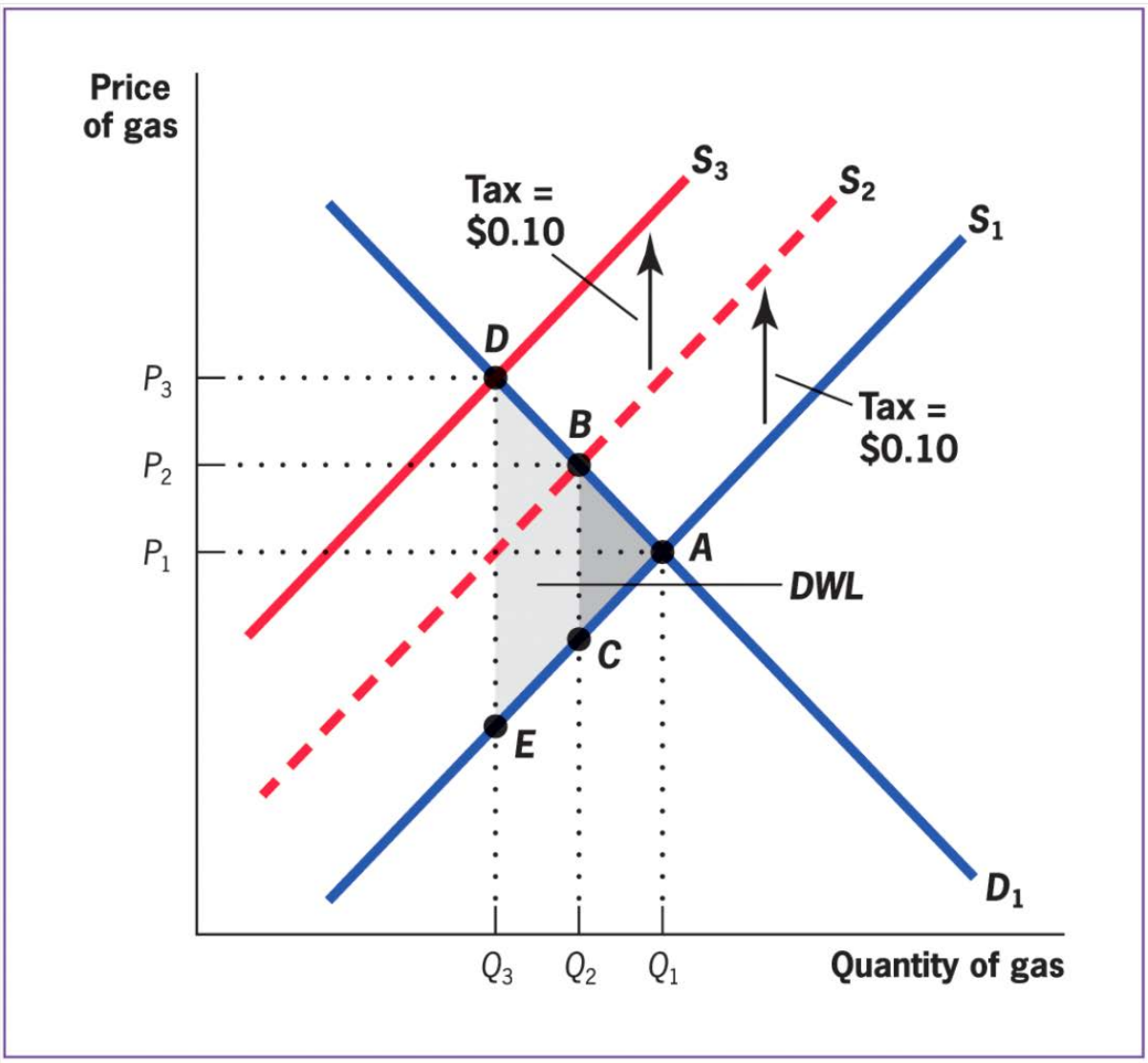

FIGURE 20-5 Marginal Deadweight Loss Rises with Tax Rate • An initial $0.10 tax on suppliers causes a deadweight loss triangle *BAC.* An additional $0.10 tax causes a much larger deadweight loss, *DAE.* The trapezoid *DBCE* is the marginal deadweight loss that is added to the initial deadweight loss of triangle *BAC.*

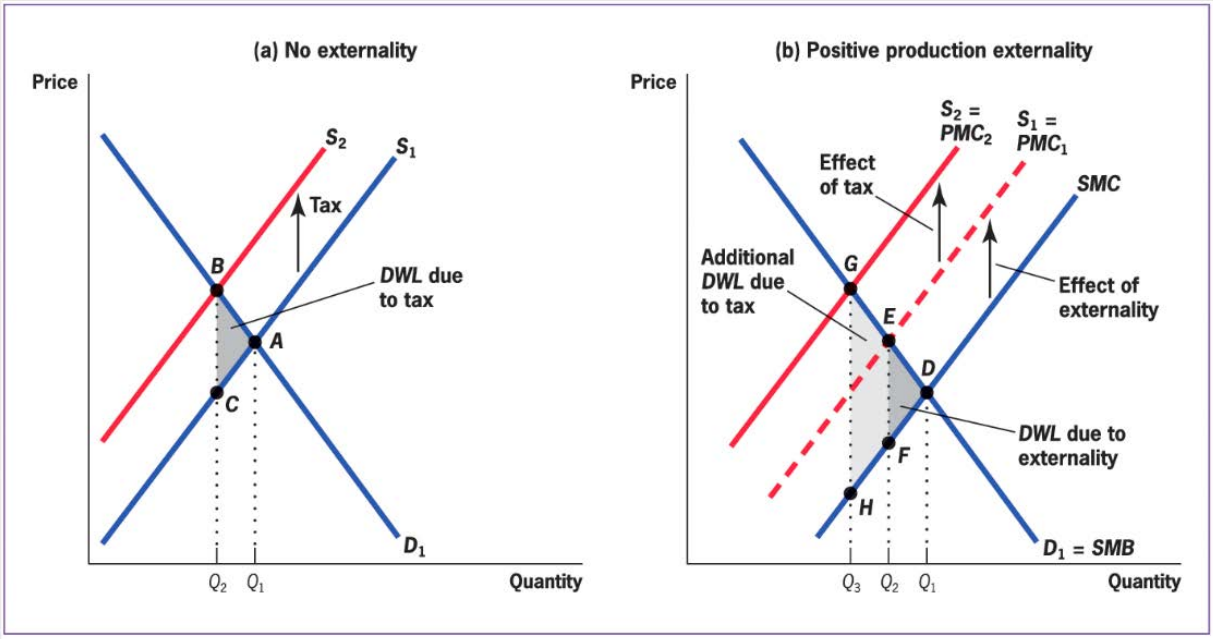

FIGURE 20-6 Pre-existing Distortions Matter • In panel (a), a tax in a market with no pre-existing distortions (such as externalities) creates a deadweight loss equal to triangle *BAC*. In panel (b), a positive externality in the market has created a deadweight loss triangle *EDF;* imposing a tax on this market results in a deadweight loss that is larger by the area of trapezoid *GEFH*. The total *DWL* in the market with a positive externality and a tax is the area of triangle *GDH*.

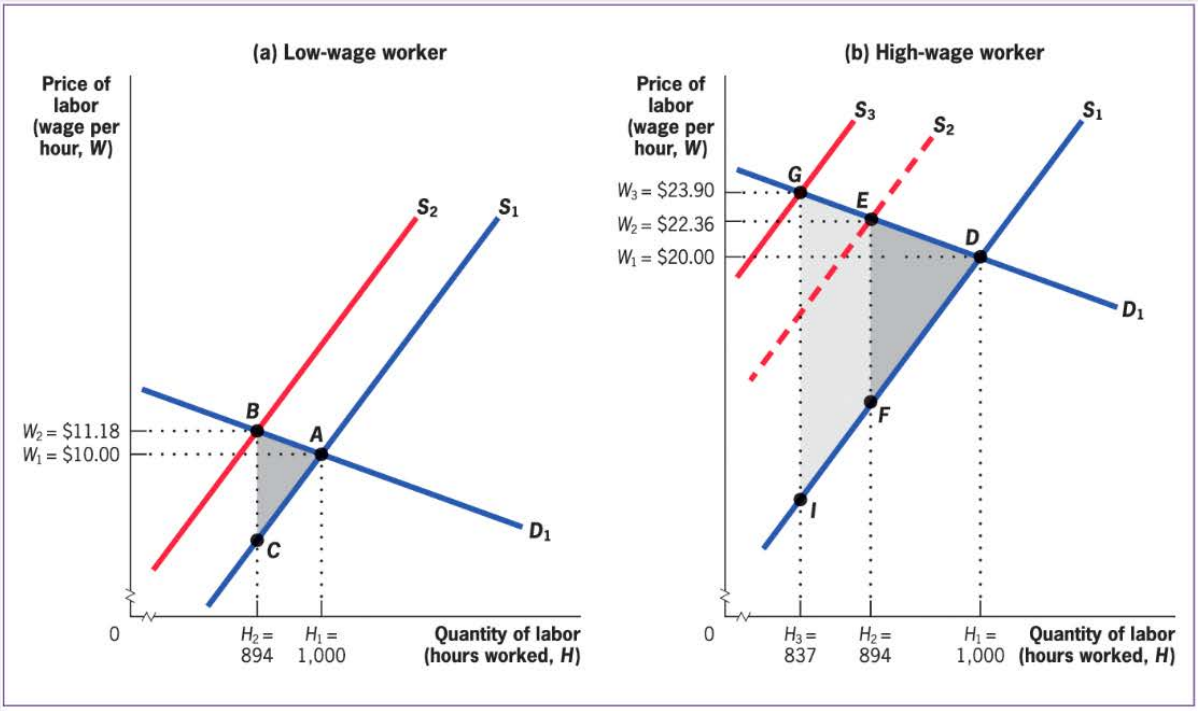

FIGURE 20-7 Low Rates Imposed on a Broad Base Are Desirable • Initially, the government imposes an equal tax on the low-wage worker and the high-wage worker, which results in deadweight losses of triangles *BAC* and *EDF* in panels (a) and (b). When the government replaces this system with one of no tax on the low-wage worker, there is then no *DWL* for this worker, but the *DWL* for the high-wage worker increases by the trapezoid *GEFI*, resulting in an overall increase in deadweight losses.

			Low-Wage Worker (panel a)		High-Wage Worker (panel b)		
	Tax Rate Below $10,000	**Tax Rate Above $10,000**	**Hours of Labor Supply**	**Deadweight Loss from Taxation**	**Hours of Labor Supply**	**Deadweight Loss from Taxation**	**Total Deadweight Loss**
No tax	0	0	1,000 (H_1)	0	1,000 (H_1)	0	0
Proportional tax	20%	20%	894 (H_2)	$115.71 (area *BAC*)	894 (H_2)	$231.42 (area *EDF*)	$347.13 $(BAC + EDF)$
Progressive tax	0%	60%	1,000 (H_1)	0	837 (H_3)	$566.75 (area *GDI*)	$566.75 $(EDF + GEFI)$

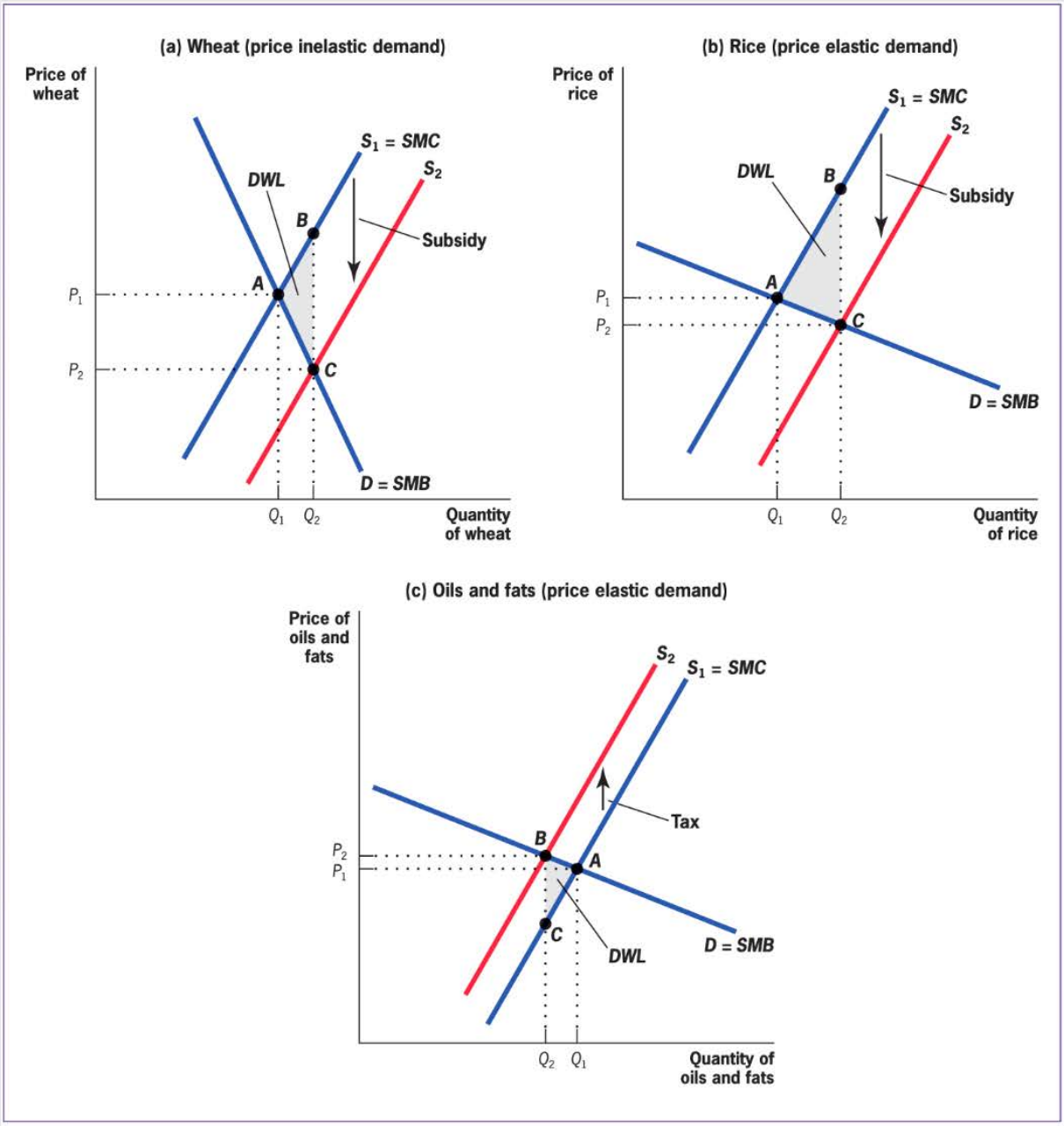

FIGURE 20-8 Efficiency Consequences of Subsidies and Taxes in Pakistan • In panel (a), the market for wheat, demand is fairly inelastic and supply is subsidized, leading quantity to increase from Q_1 to Q_2 with a deadweight loss of *BAC*. In panel (b), the market for rice, demand is very elastic, so when supply is subsidized the quantity rises by much more (from Q_1 to Q_2), and the deadweight loss is larger (*BAC*). In panel (c), the market for oils and fats, demand is also very elastic, so even the small tax leads to a large reduction in quantity from Q_1 to Q_2, with a deadweight loss of *BAC*.

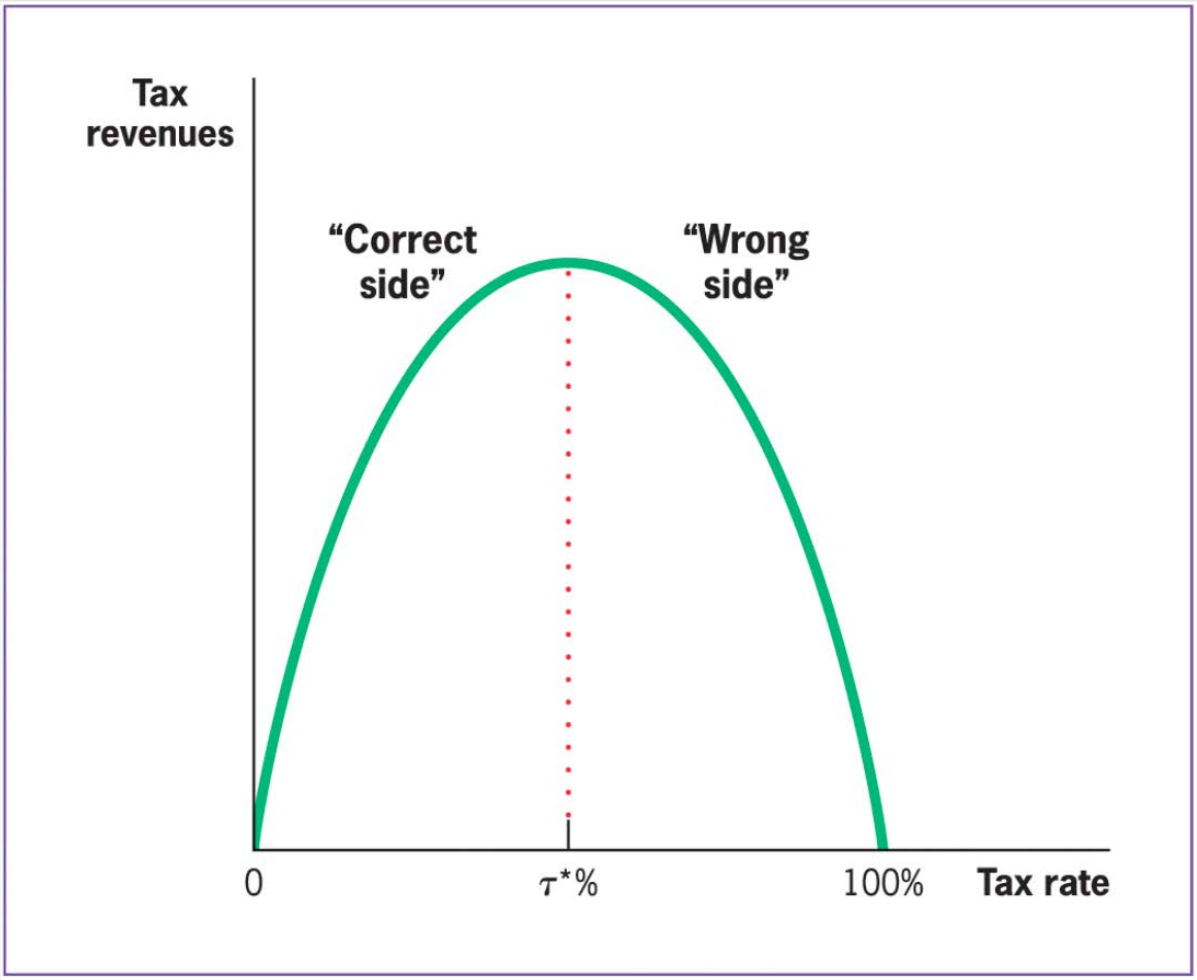

FIGURE 20-9 The Laffer Curve • As tax rates rise from 0 to τ^*, tax revenues rise; but when tax rates rise above τ^* toward 100%, tax revenues fall.

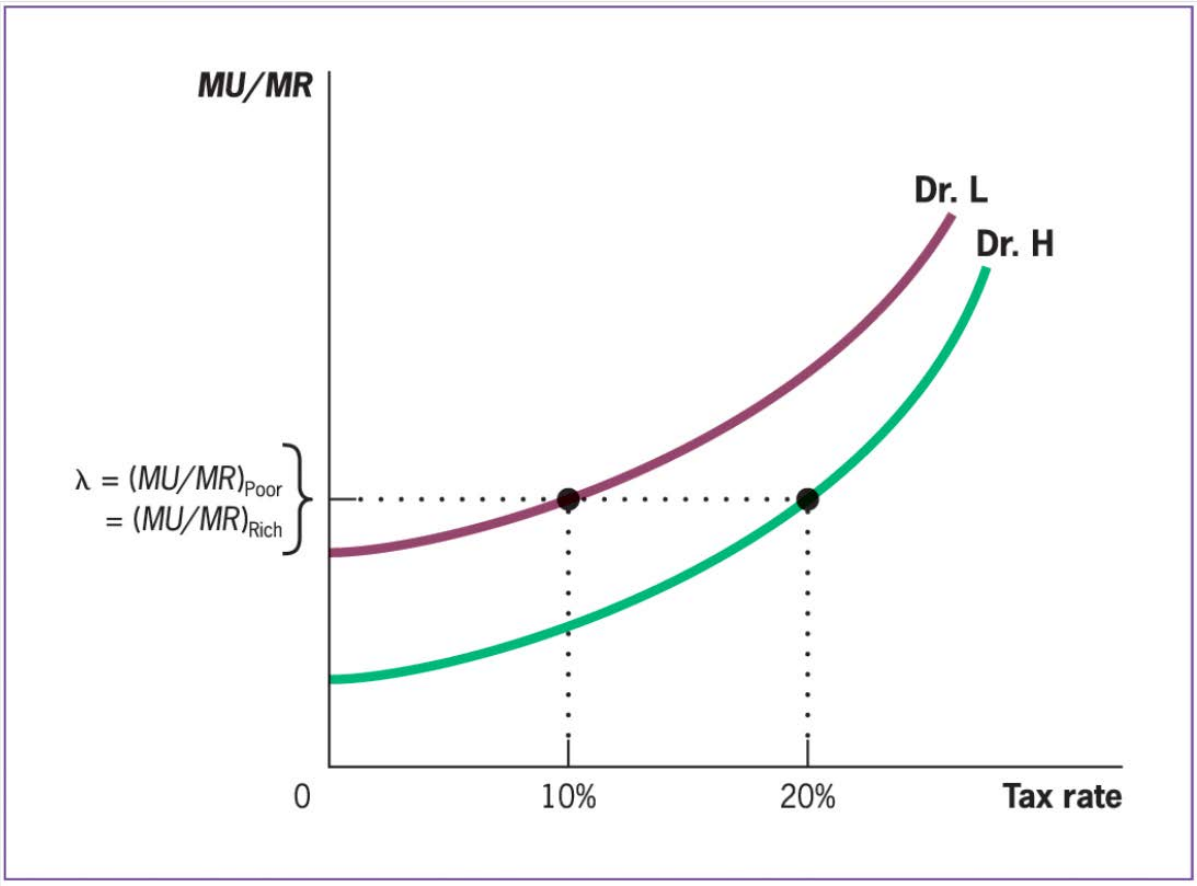

FIGURE 20-10 Optimal Income Taxation • The ratio of marginal utility to marginal revenue rises as tax rates rise for any taxpayer, but this ratio for Dr. H is everywhere below the ratio for Dr. L. Optimal income tax rates are those that equate this ratio across taxpayers. Here, the optimal rates are 10% for Dr. L and 20% for Dr. H.

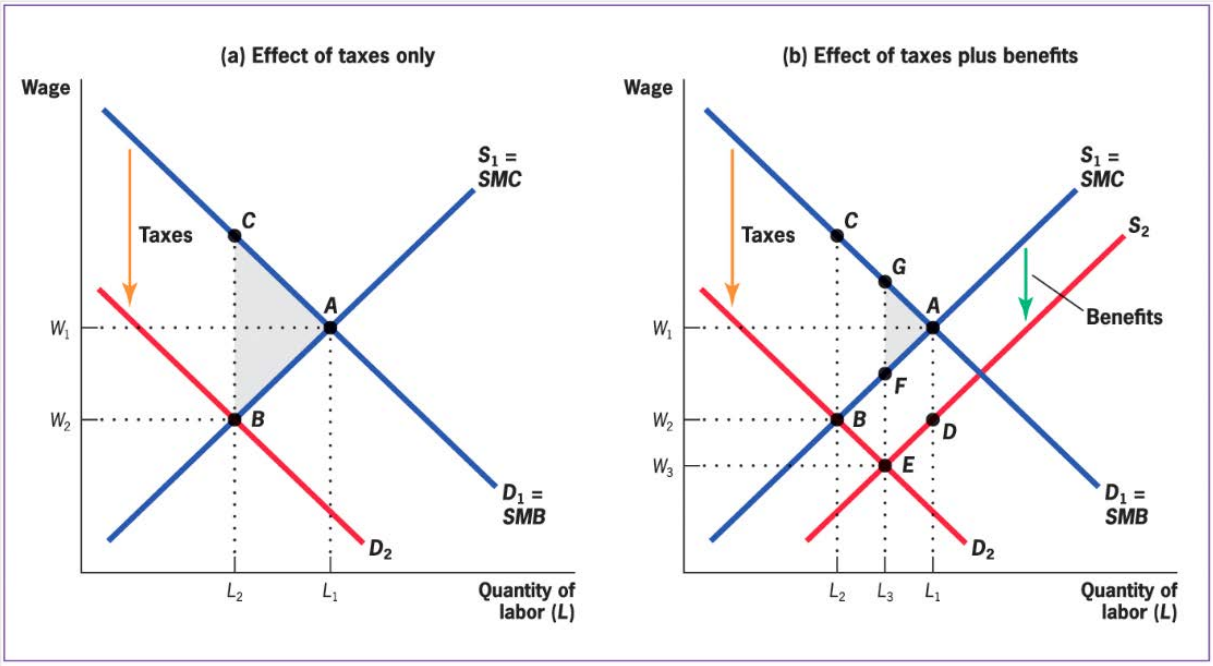

FIGURE 20-11 Tax-Benefit Linkages • (a) A pure tax on labor would shift the demand curve from D_1 to D_2, reducing labor from L_1 to L_2 and creating the deadweight loss triangle *CAB*. (b) If those taxes are tied to benefits provided to workers, then supply shifts out to S_2 because the benefits act as an effective rise in wages and make supplying labor more attractive. Labor supply falls only to L_3, and the deadweight loss triangle shrinks to *GAF*.

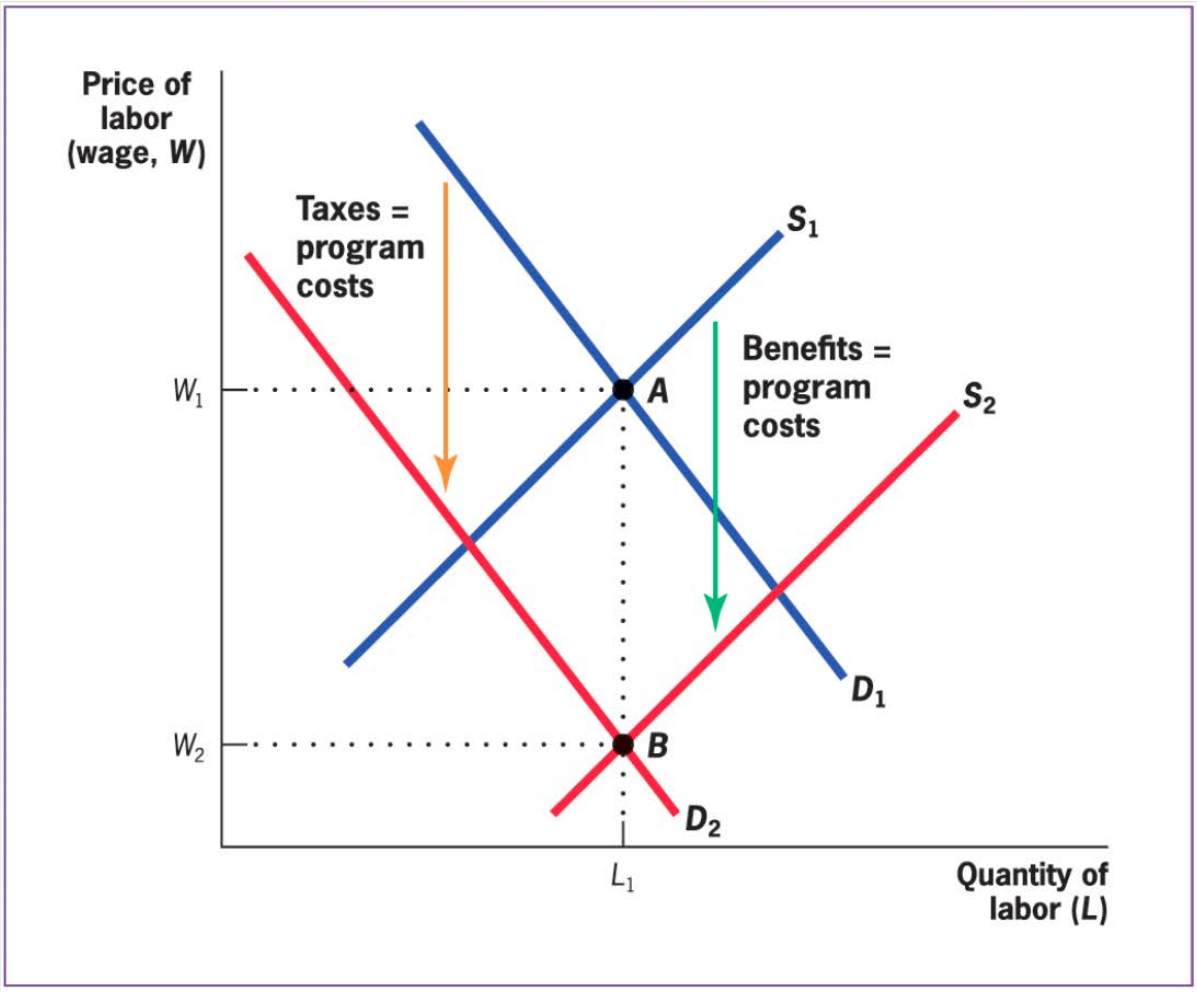

FIGURE 20-12 Taxation with No Deadweight Loss due to Linkages • When workers value the tax-financed benefit so highly that they are willing to accept its full cost in lower wages, there is no change in employment when the tax is imposed. Because the increase in labor supply exactly offsets the reduction in labor demand, wages fall to W_2, while the quantity of labor remains at L_1.

14.41 Public Finance and Public Policy
Fall 2024