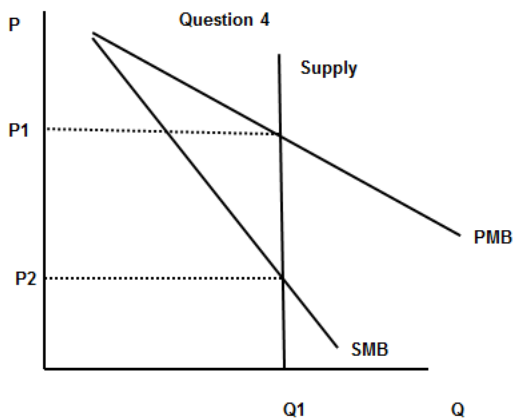


Suggested Answers
Problem Set 3
Health Economics

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1. Please see the final page of the answer key for the graph. To determine the market clearing level of quantity, set inverse supply equal to inverse demand and solve for Q . $40 + 4Q = 400 - 8Q$, so $360 = 12Q$ or $Q = 30$. Initial equilibrium is point a below. Substitute this back into either inverse demand or supply and solve for P , $P = 40 + 4Q = 40 + 4(30) = 160$. $CS = 0.5(400 - 160)(30) = 3600$. $PS = 0.5(160 - 40)(30) = 1800$.
2. Given the externality, the $MSC = 52 + 4Q$. The socially optimal output is where $MSC = \text{Inverse demand}$, $52 + 4Q = 400 - 8Q$ and therefore $Q = 29$. Market clearing price should be $P = 400 - 8Q = 400 - 8(29) = 168$ (point b). Because of the externality, market production is greater than socially optimal. The social cost of producing $Q = 30$ is $MSC = 52 + 4Q = 172$. Since the externality is not internalized, consumers receive a benefit of $dbae$. The social cost is $dbce$. Therefore, deadweight loss is abc . This value is $0.5(1)(12) = 6$.
3. The market equilibrium is determined by setting inverse supply equal to inverse demand and solving for Q : $8 + 2Q = 80 - Q$, so $72 = 3Q$ so $Q = 24$. Price would equal $8 + 2(24) = 56$. The $MSB = 80 - 2Q$ so the socially optimal consumption would be at the point where inverse supply equals MSB , or $8 + 2Q = 80 - 2Q$ so $72 = 4Q$ or $Q = 18$. Suppliers would supply this amount at a price of $8 + 2Q = 8 + 2(18) = 44$. However, consumers would only demand this amount if price were equal to $P = 80 - Q = 80 - 18 = 62$. Therefore, the tax that should be imposed on consumers is $(62 - 44)$ or \$18 per unit. Verify your results. When a per unit tax is imposed, the demand falls by an amount equal to the tax, or $P = 80 - \$18 - Q$, or demand is now $P = 62 - Q$. The market equilibrium when there is a tax is determined by the intersection of the inverse supply and the new demand curve, or $8 + 2Q = 62 - Q$, or $54 = 3Q$ or $Q = 18$. The price received by sellers is $8 + 2Q = 8 + 2(18) = \$44$ and consumers pay $\$44 + \18 or \$62.
4. Please see the graph below. Because the supply curve is vertical, the market clearing output and the socially optimal are both Q_1 . In this case, there is no dead weight loss associated with the externality.



5. Employers typically do not charge smokers or drinkers higher insurance premiums because they can only imperfectly monitor these behaviors and the costs of monitoring may be prohibitive.
6. The annual probability of death from a motor vehicle accident is 0.0001. A 25% reduction would reduce that probability by 0.000025. Consumers are willing to pay \$76 for this reduction so the value of a statistical life is $\$76/0.000025 = \$3,040,000$.
7. In order for these estimates to accurately reflect what people are willing to trade income for risk, one must make a number of assumptions about the labor market. First, one must assume that workers understand the risks they face. If workers systematically over/under state job risks, then workers are not trading income for actual risk. Likewise, the models assume there is free flow of workers across jobs. If workers find their wage too low or risk too high, the models assume they can move to a job that accurately reflects their preferences. But if there are factors that restrict mobility (e.g, fixed costs of a move, a working spouse, etc.) then the wage/risk gradient will not reflect the true preferences of the workers. Finally, factors that impact wage rigidity like collective bargaining may also mean the estimated relationship does not indicate worker preferences.
8. A quick search of Google notes that sometime in July of 2008, the EPA reduced their estimates for the value of a statistical life to \$6.8 million, down by about a million from their previous estimates.
9. I've filled in the difference in difference estimates below:

	Average Retail Price per Pack			Per capita consumption in packs per year		Δ
	Before	After	Δ	Before	After	
IN	\$3.10	\$3.55	0.45	121	101	-20
States w/ out a tax change	\$2.94	\$3.07	0.13	104	98	-6
		$\Delta \Delta$	0.32			-14

The difference-in-difference estimate suggests that taxes raised the retail price by 32 cents and reduce per capita consumption by 14 packs per year. The elasticity of demand $\zeta_d = (\% \Delta Q) / (\% \Delta P)$. $\% \Delta P = \Delta P / P$ and using \$3.10 as the base price, $\% \Delta P = 0.32 / 3.10 = 0.103$. $(\% \Delta Q) = (\Delta Q / Q)$ and using 121 as base consumption, $(\% \Delta Q) = -14 / 121 = -0.114$. the elasticity of demand in this case is rather high at $-0.114 / 0.103 = -1.11$

10. This question is a review of elasticities of demand. The price of cigarettes was \$1.90/pack before he settlement and an increase in prices of \$0.55/pack is a 28.9% increase in price. We are given that the elasticity of demand for cigarettes is -0.40 and $\xi = \% \Delta Q / \% \Delta P$. Therefore, $\% \Delta Q = \xi (\% \Delta P) = -0.40 (0.289) = -0.116$. The price hike reduced demand by 11.6 % or by (21 billion)(0.116) = 2.43 billion packs per year.

