Exam 1, Fall 2005

Notes on Solution

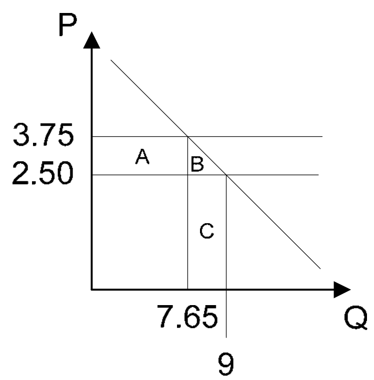
Part 1: Hurricanes and Gasoline

Note: The problem SHOULD have included the information on the number of gallons in a barrel but it did not. These results show what you would have obtained if you treated a gallon and a barrel as the same thing. In reality, there are 42 gallons in a barrel.

Elasticity:	-0.3	
Percent change in Q:	-15	
Initial Q:	9	million
Initial P:	2.5	

Percentage change in P:	-15/-0.3	=	50	percent
New P:	2.5*1.5	=	3.75	dollars
Change in Q:	-0.15*9	=	-1.35	million
New Q:	9-1.35	=	7.65	million

The diagram looks as follows:



Consumers lose areas A and B. Producers gain area A. B is DWL. What happens to area C depends on how you interpreted the problem. If you took $2.50 to be the producers' W2A for gas, C was NOT part of PS before the hurricanes and is therefore NOT a loss to producers. On the other hand, if you treated the supply curves as perfectly vertical, which is consistent a perfectly inelastic supply curve, C is a loss of PS. Either interpretation is OK. The true supply curve is between the two extremes: it is steep, but not perfectly vertical.

Computing the areas:

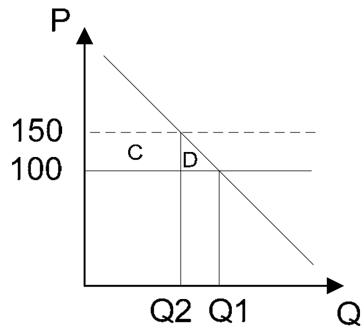
A:	7.65*1.25	=	$	9.56	million per day
B:	0.5*1.35*1.25	=	$	0.84	million per day
C:	(9-7.65)*2.50	=	$	3.38	million per day
∆CS	-A-B	=	$	-10.41	million per day
∆PS (v1)	A	=	$	9.56	million per day
∆PS (v2)	A-C	=	$	6.19	million per day
DWL (v1):	-B	=	$	-0.84	million per day
DWL (v2):	-B-C	=	$	-4.22	million per day

Over 28 Days:

∆CS		=	$	-291.38	million per month
∆PS (v1):		=	$	267.75	million per month
∆PS (v2):		=	$	173.25	million per month
DWL (v1):		=	$	-23.63	million per month
DWL (v2):		=	$	-118.13	million per month

Part 2: Taxes

P orig	$	100
Tax	$	50
P new	$	150
%ΔP		50%



Group		A	B
η		-0.2	-1
Q1		1,000	1,000
%ΔQ	η*%ΔP	-10%	-50%
ΔQ	%ΔQ*Q1	-100	-500
Q2	Q1+ΔQ	900	500
ΔCS	C+D	$ -47,500	$ -37,500
Revenue	C	$ 45,000	$ 25,000
DWL	D	$ -2,500	$ -12,500
DWL/Rev	D/C	$ -0.06	$ -0.50

The tax is inefficient: it costs people more in lost CS than it raises in revenue. The inefficiency is particularly severe for group B: every dollar of revenue raised from it creates $0.50 worth of DWL: that is, raising a dollar of tax revenue from group B costs the group $1.50 in CS. The DWL per dollar is worst for group B because its demand is most elastic (-1.0 vs -0.2 for group A). The elastic demand means that the group is very sensitive to the price and cuts its consumption a lot under the tax.

Part 3: Demand and Supply

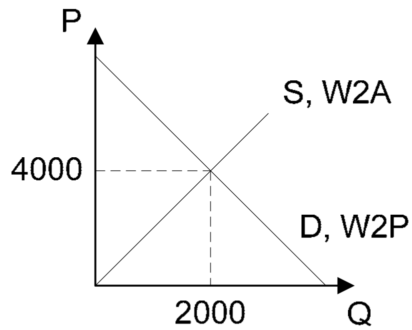
3a) initial equilibrium

W2P = 14000 - 5Q
W2A = 2000 + Q

W2P = W2A
14000 - 5Q = 2000 + Q
12000 = 6Q
2000 = Q

W2P = 14000 - 5*2000 = 4000
W2A = 2000 + 2000 = 4000
P = 4000

Graphing:



3b) equilibrium with a $1200 subsidy

W2P = 14,000 - 5Q
W2A = 2000 + Q

At the new equilibrium:

W2P = P	buyers purchase until W2P = P
W2A = P + 1200	sellers supply as until W2A = P + subsidy
W2A = W2P + 1200	combining: sellers sell until W2A = W2P + subsidy

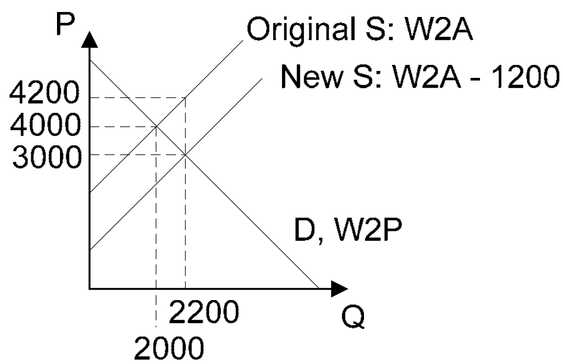
W2P + 1200 = W2A
14,000 - 5Q + 1200 = 2000 + Q
13,200 = 6Q
2200 = Q

W2P = 14,000 - 5*2200 = 3000
W2A = 2000 + 2200 = 4200

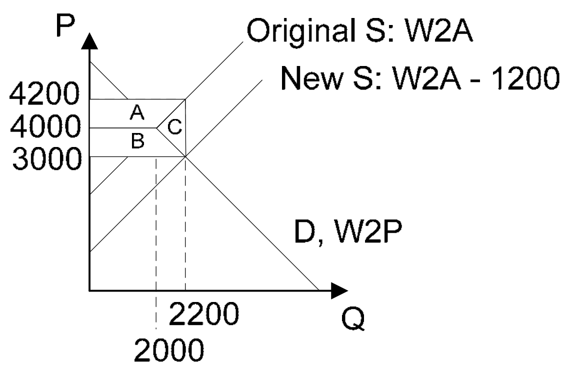
Purchaser price: 3000
Producer price: 4200
Quantity: 2200

3c) Diagram

The market equilibrium:



Redrawing the diagram to show changes in surplus more clearly (a single diagram was sufficient for the exam):



Change in CS: +B
Change in PS: +A
Change in government revenue: -(A+B+C)
Deadweight loss: C

Part 4: Rent Control

Initial equilibrium and elasticities:

P1	$	1,000
Q1		25,000
ηd		-0.5
ηs		1.0

P2	$	800	rent control price

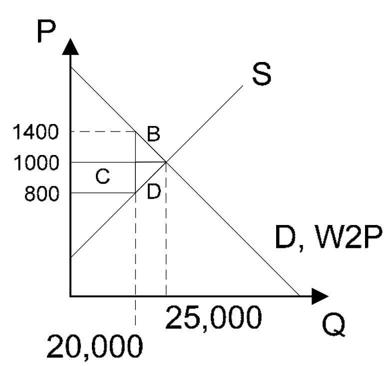
Change in apartments supplied by landlords:

%ΔP		-20%
%ΔQ	ηs*%ΔP	-20%
ΔQ	%ΔQ*Q1	-5000
Q2	Q1+ΔQ	20,000

To calculate the full effects of the policy, we need to calculate the height of the demand curve at 20,000 apartments. That's easy to do using the percentage change in quantity and the elasticity of demand:

%ΔQ			-20%	
%ΔP	%ΔQ/ηd		40%	price change needed to drive quantity demanded down
ΔP	P1*%ΔP	$	400	
P2	P1+ΔP	$	1,400	W2P of person who gets the last apartment (20,000)

Diagram:



Effect on surplus:

B		$ 1,000,000
C		$ 4,000,000
D		$ 500,000

ΔCS	-B+C	$ 3,000,000
ΔPS	-C-D	$ -4,500,000
DWL	-B-D	$ -1,500,000