

US EPA ARCHIVE DOCUMENT



Economic Impact and Employment Analysis

OAQPS/AEG Approach to Evaluating Economic Impacts
of Environmental Regulations

Presentation for Ozone Transport Commission
September 28, 2012

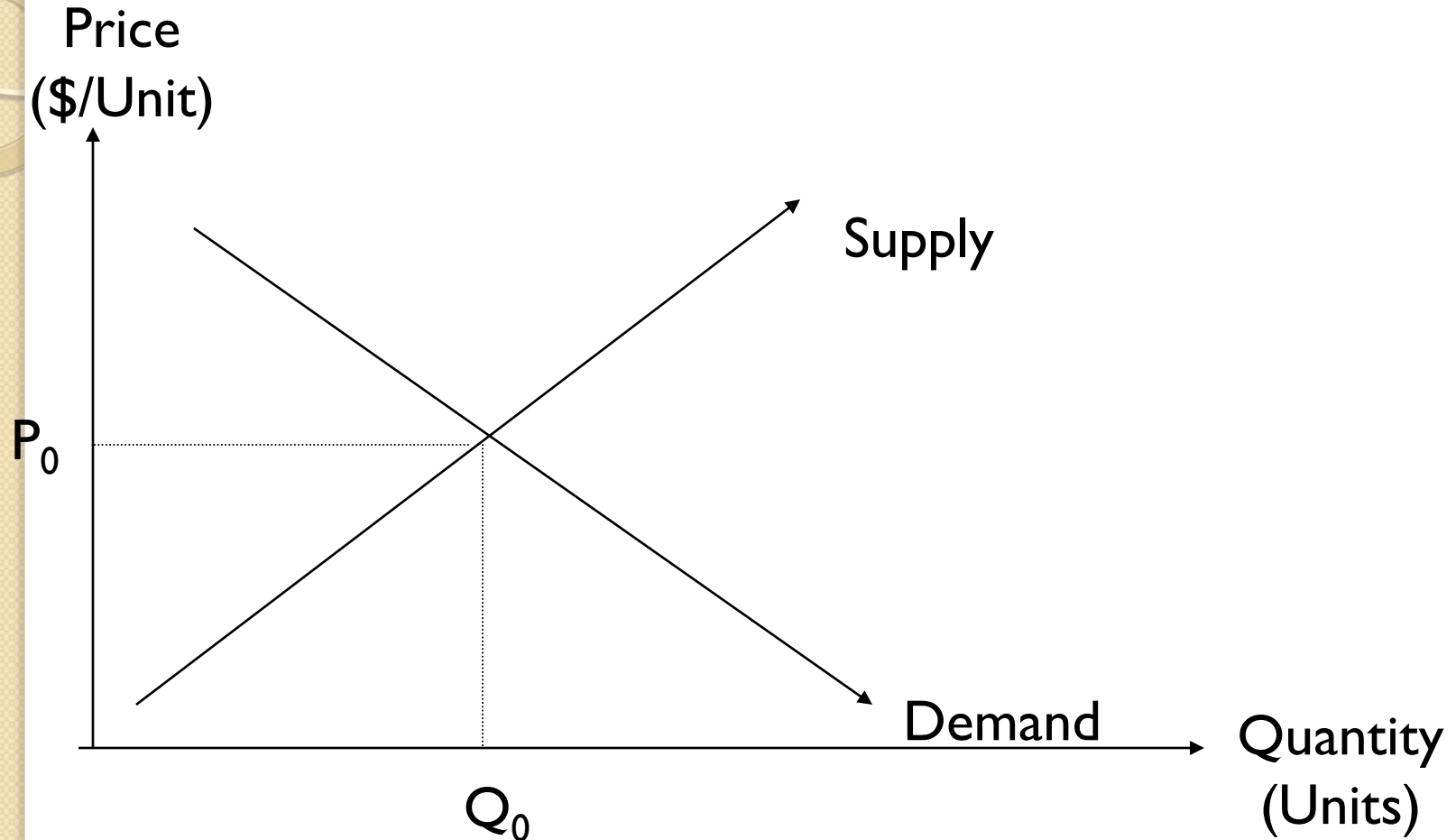
Why Prepare an Economic Impact Analysis (EIA)?

- Legal and Executive Order Requirements
- Statutes:
 - Clean Air Act
 - Regulatory Flexibility Act (RFA) & Small Business Regulatory Flexibility Act (SBREFA)
 - Unfunded Mandates Reform Act (UMRA)
- Executive Orders (selected):
 - EO 12866 and 13563 - Regulatory Planning and Review
 - EO 13211 - Statement of Energy Effects
- Distributional Impacts
 - Goes beyond control and compliance costs, i.e., answers the question of who bears the burden of the regulation and how much

AEG Economic Impact Modeling Approach for MACT, Residual Risk and NSPSes

- Scope = Partial equilibrium
 - Partial equilibrium - analysis of impacts in one market or industry holding all other impacts constant
- Length of run = intermediate run (usually 3-5 years from rule promulgation)
- Comparative static vs. dynamic
- Market Structure, e.g., perfect competition
- Important Note: AEG uses compliance costs as an input to its econ. impact modeling for these standards
 - Compliance costs prepared by SPPD (a sister division in OAQPS)

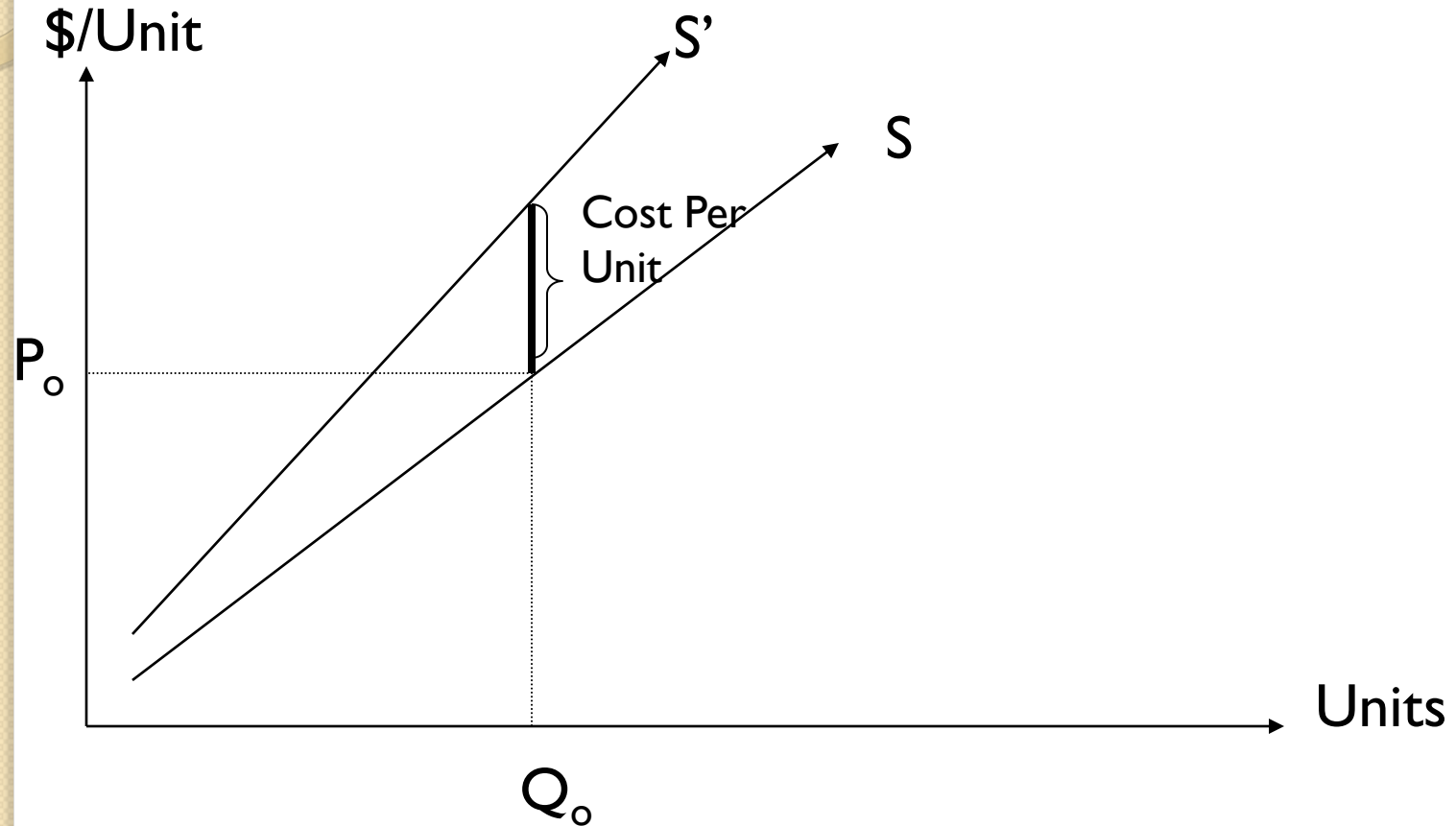
Market Demand And Supply



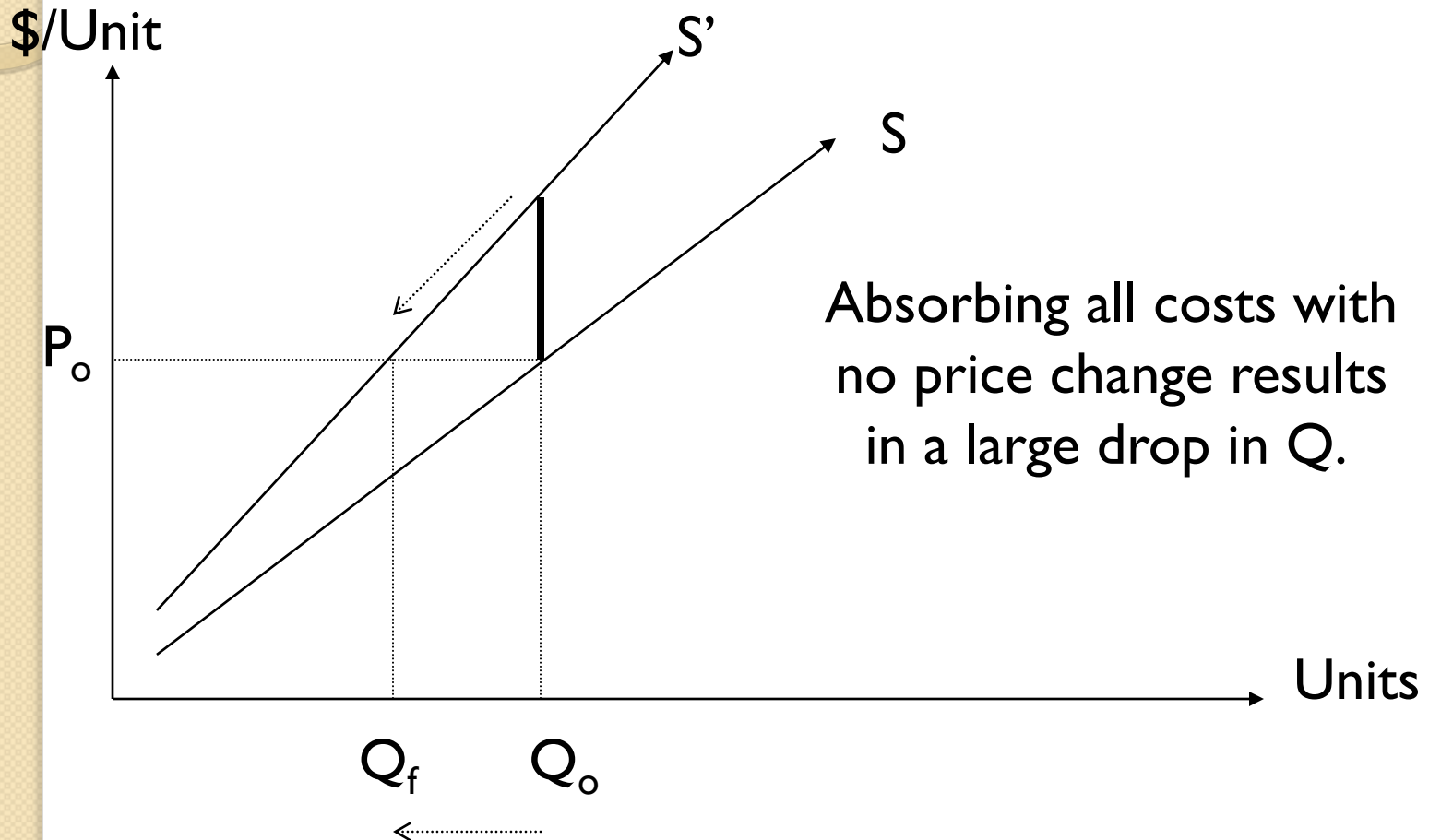
Demand: P increases $\Rightarrow Q_d$ decreases

Supply: P increases $\Rightarrow Q_s$ increases

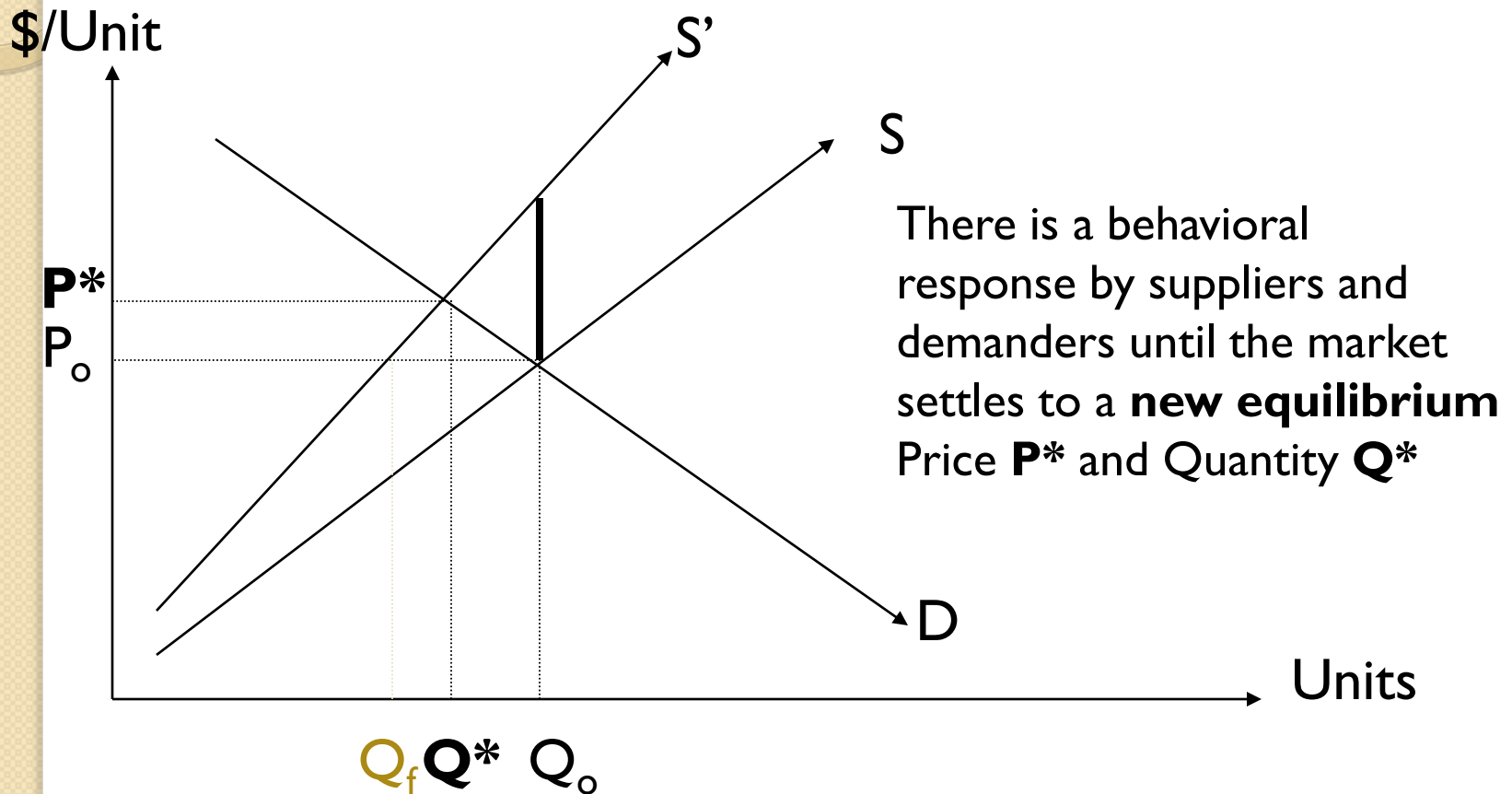
Full-Cost Absorption: No Supply Response



Full-Cost Absorption: With Supply Response



Partial Equilibrium Model: with Supply and Demand Response



AEG Economic Impact Approach for NAAQS RIAs

- With NAAQS analyses, multiple industries are often impacted, unlike other rules OAQPS issues
- Analysis depends upon the scope of the projected nonattainment (no. of counties, amount of exceedance) and the magnitude of the annualized costs.
 - Limited nonattainment – costs allocated by NAICS codes, limited economic impact analyses
 - Extensive nonattainment – CGE modeling preferred
 - OAQPS has EMPAX as a CGE model; working on updates and revisions to make it useful for NAAQS analyses
- Economic impact modeling does not include extrapolated costs
 - Extrapolated costs not distributed by industry; cannot include in economic impact modeling

RFA-SBREFA, UMRA, and Statement of Energy Effects

- RFA/SBREFA – Requires initial scoping analysis using a variety of financial indicators such as:
 - Annual Cost-to-sales ratios
 - Initial scoping analysis can provide some indication of potential economic impacts to affected firms; not a substitute for an full EIA
 - Applied often for small entity impact analysis; if impacts of a proposed rule are significant and substantial enough; then EPA must convene a SBREFA Panel
- UMRA – compare cost of the regulation to budget or gross receipts of the governmental entity.
- Statement of Energy Effects – estimate impacts on energy prices, output, transmission, and distribution

Employment Analysis

- EPA/OAQPS estimates employment impacts for regulations, particularly for economically significant ones
- EPA produces employment impacts directly related to compliance requirements:
 - Full-time equivalents (FTEs) associated with new control equipment (MATS)
 - Analysis is found in RIA for final rule
 - FTEs associated with monitoring, testing, and recordkeeping requirements
 - RICE rules, analysis in RIA for proposed reconsideration rules, and other rules

Employment Analysis (cont.)

- EPA also estimates impacts to the regulated industry through Morgenstern, Pizer, Shih approach (or MPS approach)
- Prepared with the support of RFF, econometric study based on 1979–1991 data for four industries (pulp and paper, plastics, petroleum, and steel). Paper became a peer-reviewed journal article (2002).
- The “Demand Effect” -- higher production costs raise market prices, reducing consumption (and production), thereby reducing demand for labor within the regulated industry
- The “Cost Effect” -- As production costs increase, plants use more of all inputs, including labor, to maintain a given level of output.
- The “Factor-Shift Effect” -- Regulated firms’ production technologies may be more or less labor intensive after complying with a regulation (i.e., more/less labor is required per dollar of output)
- Sum of these effects = net employment impact to a regulated industry
 - Used to analyze impacts for MATS, ICI boiler standards
 - While there are limitations from age of data, still a good approach for estimating such impacts where appropriate

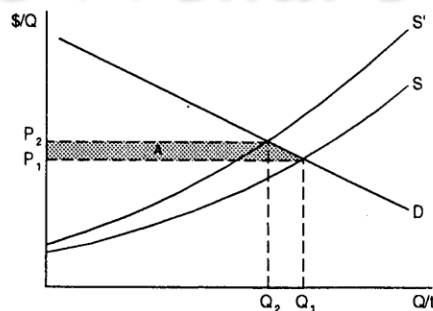
Conclusions

- Economic Impact and Employment Analyses can provide valuable information to regulatory decision-makers.
- For More Information, please visit:
- EPA Guidelines for Preparing Economic Analysis
 - Prepared by EPA's NCEE; available at <http://yosemite.epa.gov/ee/epa/eed.nsf/pages/guidelines.html>
- ECAS website on TTN <http://www.epa.gov/ttnecas/>
 - RIA/EIA Reports
 - OAQPS Economics Resource Manual

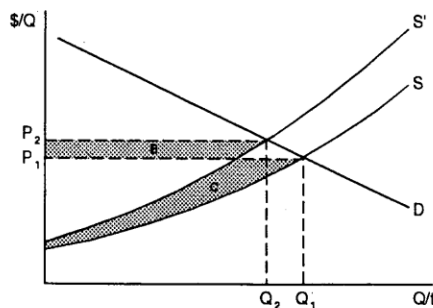


APPENDIX

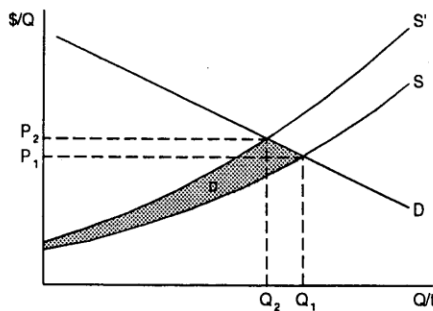
Economic Welfare Changes



(a) Change in Consumer Surplus with Regulation



(b) Change in Producer Surplus with Regulation



(c) Net Change in Economic Welfare with Regulation

Figure 5-14. Economic Welfare Changes with Regulation: Consumer and Producer Surplus

Baseline Scenario

REFINED MOTOR GASOLINE									
		Market Data	BASE						
		Price (\$/barrel)	\$90.00						
		Output (10 ⁶ barrels/yr)	3,134						
						COSTS			
CO_ID	FAC_ID	SUPPLIER NAME	EMP	OUTPUT	REV	PROD	REG	PROFIT	CLOSE
1	1	Texaco--Bakersfield, CA	120	150	\$13,500	\$13,163	\$0	\$338	N
1	2	Texaco--Los Angeles, CA	200	250	\$22,500	\$21,938	\$0	\$563	N
1	3	Texaco--Puget Sound, WA	200	250	\$22,500	\$21,938	\$0	\$563	N
2	4	Chevron--Portland, OR	240	300	\$27,000	\$26,055	\$0	\$945	N
2	5	Chevron--Philadelphia, PA	100	125	\$11,250	\$3,729	\$0	\$7,521	N
3	6	Alaskan Oil--Anchorage, AK	20	25	\$2,250	\$2,183	\$0	\$68	N
4	7	Valero Refining--TX	40	50	\$4,500	\$4,365	\$0	\$135	N
		ALL OTHER DOMESTIC	1,260	1,575	\$141,750	\$136,080	\$0	\$5,670	N
DOMESTIC TOTAL			2,180	2,725	\$245,250	\$229,449	\$0	\$15,801	0
		FOREIGN IMPORTS		409					
MARKET TOTAL				3,134					

Full-Cost Absorption – No Supply Response

(P, Q Remain Unchanged)

		Market Data	BASE	WREG	Change				
		Price (\$/barrel)	\$90.00	\$90.00	\$0.00				
		Output (10 ⁶ barrels/yr)	3,134	3,134	0				
						COSTS			
CO_ID	FAC_ID	SUPPLIER NAME	EMP	OUTPUT	REV	PROD	REG	PROFIT	CLOSE
1	1	Texaco--Bakersfield, CA	120	150	\$4,500	\$4,388	\$12	\$101	N
1	2	Texaco--Los Angeles, CA	200	250	\$7,500	\$7,313	\$35	\$153	N
1	3	Texaco--Puget Sound, WA	200	250	\$7,500	\$7,313	\$35	\$153	N
2	4	Chevron--Portland, OR	240	300	\$9,000	\$8,685	\$60	\$255	N
2	5	Chevron--Philadelphia, PA	100	125	\$3,750	\$3,729	\$21	\$0	N
3	6	Alaskan Oil--Anchorage, AK	20	25	\$750	\$728	\$3	\$20	N
4	7	Rattlesnake Refining--TX	40	50	\$1,500	\$1,455	\$14	\$31	N
		ALL OTHER DOMESTIC	1,260	1,575	\$47,250	\$45,360	\$0	\$1,890	N
DOMESTIC TOTAL			2,180	2,725	\$81,750	\$78,969	\$180	\$2,601	0
		FOREIGN IMPORTS		409					
MARKET TOTAL				3,134					

Full Cost Absorption – With Supply Response

(Q Decreases, P Unchanged)

REFINED MOTOR GASOLINE									
		Market Data	BASE	WREG	Change				
		Price (\$/barrel)	\$90.00	\$90.00	\$0.00				
		Output (10 ⁶ barrels/yr)	3,134	3,009	-125				
						COSTS			
CO_ID	FAC_ID	SUPPLIER NAME	EMP	OUTPUT	REV	PROD	REG	PROFIT	CLOSE
1	1	Texaco--Bakersfield, CA	120	150	\$4,500	\$4,388	\$12	\$101	N
1	2	Texaco--Los Angeles, CA	200	250	\$7,500	\$7,313	\$35	\$153	N
1	3	Texaco--Puget Sound, WA	200	250	\$7,500	\$7,313	\$35	\$153	N
2	4	Chevron--Portland, OR	240	300	\$9,000	\$8,685	\$60	\$255	N
2	5	Chevron--Philadelphia, PA	0	0	\$0	\$0	\$0	\$0	Y
3	6	Alaskan Oil--Anchorage, AK	20	25	\$750	\$728	\$3	\$20	N
4	7	Rattlesnake Refining--TX	40	50	\$1,500	\$1,455	\$14	\$31	N
		ALL OTHER DOMESTIC	1,260	1,575	\$47,250	\$45,360	\$0	\$1,890	N
DOMESTIC TOTAL			2,080	2,600	\$78,000	\$75,240	\$159	\$2,601	1
		FOREIGN IMPORTS		409					
MARKET TOTAL				3,009					

Partial Equilibrium Model: with supply and demand response

REFINED MOTOR GASOLINE									
		Market Data	BASE	WREG	Change				
		Price (\$/barrel)	\$90.00	\$90.04	\$0.04				
		Output (10 ⁶ barrels/yr)	3,134	3,130	-4.0				
						COSTS			
CO_ID	FAC_ID	SUPPLIER NAME	EMP	OUTPUT	REV	PROD	REG	PROFIT	CLOSE
1	1	Texaco--Bakersfield, CA	120	150	\$4,505	\$4,388	\$12	\$106	N
1	2	Texaco--Los Angeles, CA	198	248	\$7,449	\$7,254	\$35	\$160	N
1	3	Texaco--Puget Sound, WA	198	248	\$7,449	\$7,254	\$35	\$160	N
2	4	Chevron--Portland, OR	238	297	\$8,921	\$8,598	\$59	\$263	N
2	5	Chevron--Philadelphia, PA	99	124	\$3,724	\$3,700	\$21	\$4	N
3	6	Alaskan Oil--Anchorage, AK	20	25	\$751	\$728	\$3	\$20	N
4	7	Rattlesnake Refining--TX	38	48	\$1,442	\$1,397	\$13	\$31	N
		ALL OTHER DOMESTIC	1,263	1,579	\$47,426	\$45,475	\$0	\$1,951	N
DOMESTIC TOTAL			2,175	2,719	\$81,667	\$78,793	\$178	\$2,696	0
		FOREIGN IMPORTS		411					
MARKET TOTAL				3,130					

Results: Market Level

Refined Motor Gasoline	Baseline	Changes	
		Absolute	Percent
Market price (\$/barrel)	\$30.00	\$0.04	0.1%
Market output (10 ⁶ bpy)	3,134	−4	−0.1%
Domestic production	2,725	−6	−0.2%
Affected	1,150	−10	−0.9%
Unaffected	1,575	4	0.3%
Imports	409	2	0.5%

Results: National Level for an Industry

	Baseline	Absolute	Percent
Refineries			
Revenues (\$10 ⁶ /yr)	\$81,750	-\$83	-0.1%
Total costs (\$10 ⁶ /yr)	\$78,971	\$1	0.0%
Control costs	\$0	\$178	NA
Production costs	\$78,971	-\$177	-0.2%
Pre-tax earnings (\$10 ⁶ /yr)	\$2,779	-\$84	-3.0%
Refineries (#)	32	0	0.0%
Employment (FTEs)	2,180	-5	-0.2%

Results: Distribution of Impacts Across an Industry

	Increased	Decreased			
Refineries	Profits	Profits	Closure	Total	
Facilities (#)	25	7	0	32	
Production					
Total (106 bpy)	1,575	1,150	0	2,725	
Average (bpy/facility)	63	164	0	85	
Compliance costs					
Total (\$106/yr)	\$0	\$178	\$0	\$178	
Average (\$/barrel)	\$0.00	\$0.16	\$0.00	\$0.07	
Change in profit (\$106)	\$61	-\$146	\$0	-\$84	

Results: Social Costs

Distribution of the Social Costs of the Regulation: 2012	
Change in Consumer Surplus (\$10⁶/yr)	–\$111.8
Domestic	–\$111.8
Foreign	\$0
Change in Producer Surplus (\$10⁶/yr)	–\$67.7
Domestic producers	–\$84.4
Affected	–\$145.6
Unaffected	\$61.1
Foreign producers	\$16.7
Social Costs of the Regulation (\$10⁶/yr)	\$179.5