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NEC / CEQ Climate Change Mtg, Tues, 11/19/96, 3pm, Rm. 231

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Thurs 11/17/96, 3-5pm

*cc: HW
JAF
RP*

THE WHITE HOUSE
WASHINGTON
November 14, 1996

MEMORANDUM FOR DISTRIBUTION

FROM: Michael Warren, Executive Secretary
National Economic Council

SUBJECT: Climate Change Deputies Meeting

There will be a joint NEC-CEQ Deputies meeting on climate change on Tuesday, November 19 from 3:00 - 5:00 pm in room 231 OEOB. This meeting will be chaired by Dan Tarullo and Kathleen McGinty.

Deputies plus one are invited to attend. It is important that Deputies personally attend. The agenda is attached.

Please call Kristen Panerali at the NEC at 456-5353 with your clearance information by COB Monday, November 18. Thanks.

Distribution:

Charles Curtis, DoE
Ev Ehrlich, Commerce
Jack Gibbons, OSTP
John Schmidt, DoJ
Fred Hanson, EPA
Jeff Lang, USTR
Jack Lew, OMB
Cynthia Metzler, Labor
Richard Rominger, USDA
Alicia Munnell, CEA
Sandy Berger, NSC
Ben Nye, Treasury
Tim Wirth, State

AGENDA
Climate Change Deputies Meeting
Tuesday, November 19, 1996, 3-5 pm
Room 231 OEOB

- I. Climate Science**
- II. Economic Effects**
- III. Cost-effective Mechanisms to Reduce Emissions**

Estimated Implications for Carbon Emissions Abatement by 2020: A Literature Review

Forcing a large number of disparate models into such a simple table as this necessarily does violence to some of them; many issues of comparability and choice of assumptions have been swept under the rug, and modelers might not all agree with how their results are presented. The table is a work in progress. Nevertheless, the range of variation in the results reported here gives an idea of the range of variation in the literature.

	<u>Less Ambitious Goal</u>			<u>Moderate Goal</u>			<u>More Ambitious Goal</u>		
	10% Increase over 1990			1990 Levels			10% Reduction from 1990		
	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper
Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

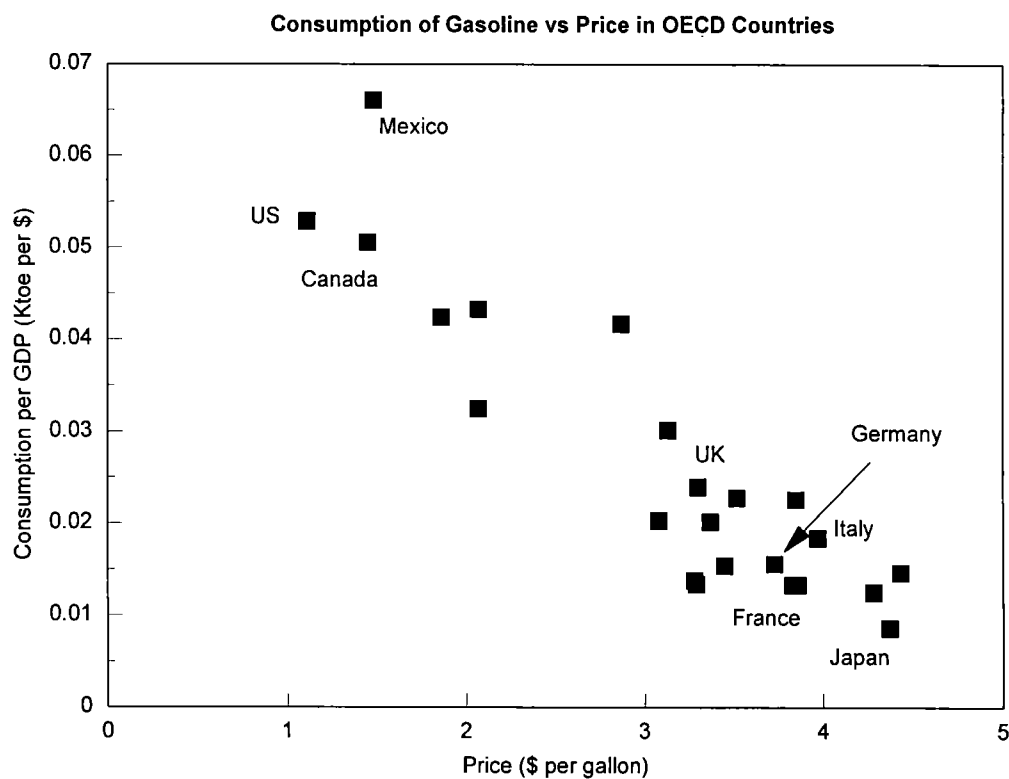
Note: A large class of "bottom-up engineering" models emphasize the existence of energy-saving technologies that could save money if implemented (e.g., "green" light bulbs). An influential 1991 study from O.T.A. showed that emissions could be reduced in this way as much as 25%. Consumer irrationality, poor access to information, or very high discount rates are invoked to explain why these technologies are not currently used more widely. To the extent that specific policies can be implemented to overcome these market imperfections, bottom-up models suggest that some reduction in energy usage could be accomplished without raising the price of energy. The key here, however, is identifying specific policies. Empirical evidence suggests that countries that use energy-saving technology tend to be those with high energy prices (see table and graph on next page).

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	Gasoline			Other Energy	
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Nec/CEA
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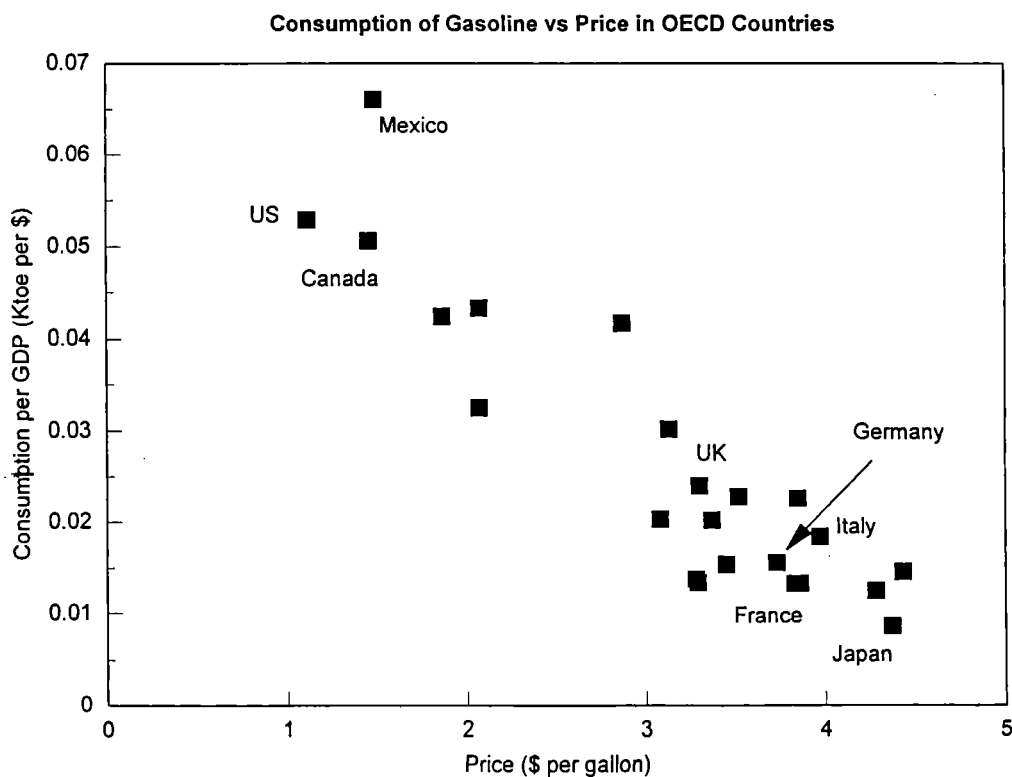
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Tom's
Goal
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A. G. \$100

0.7% of GDP
⇒ \$50 B

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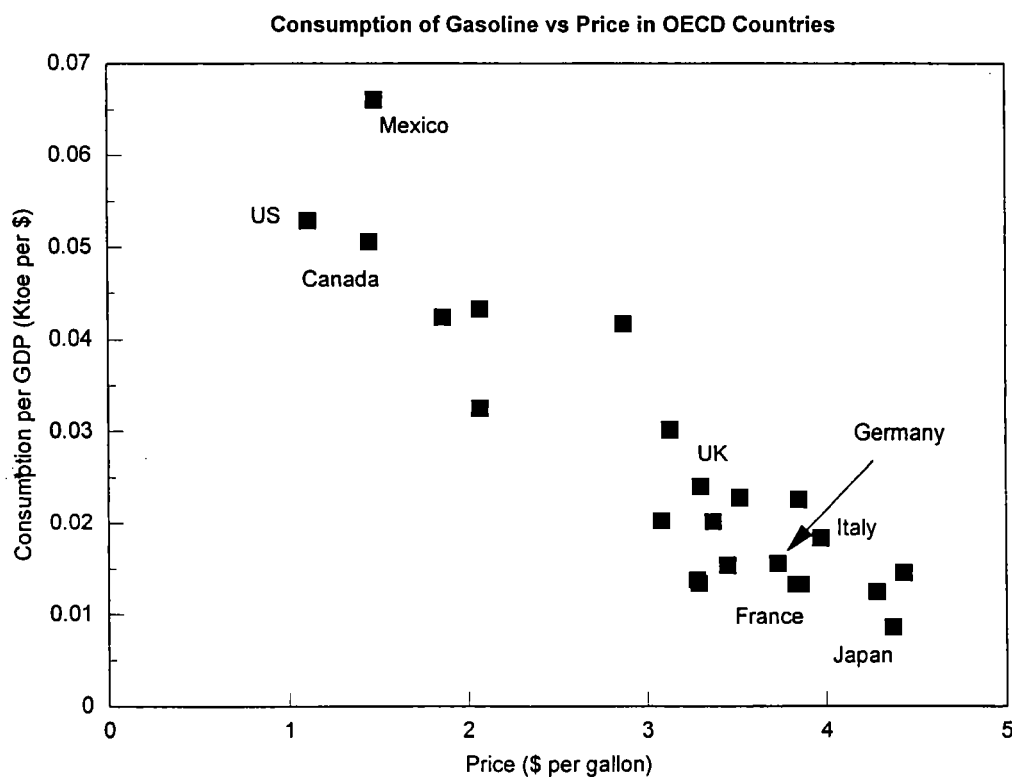
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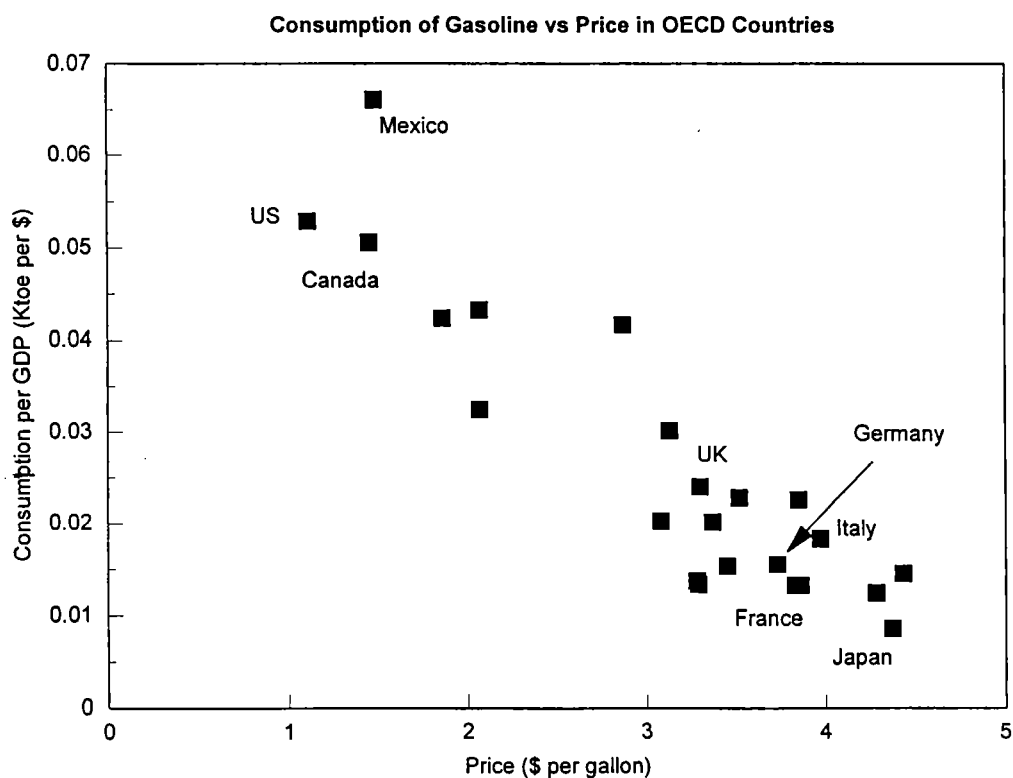
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	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper
Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
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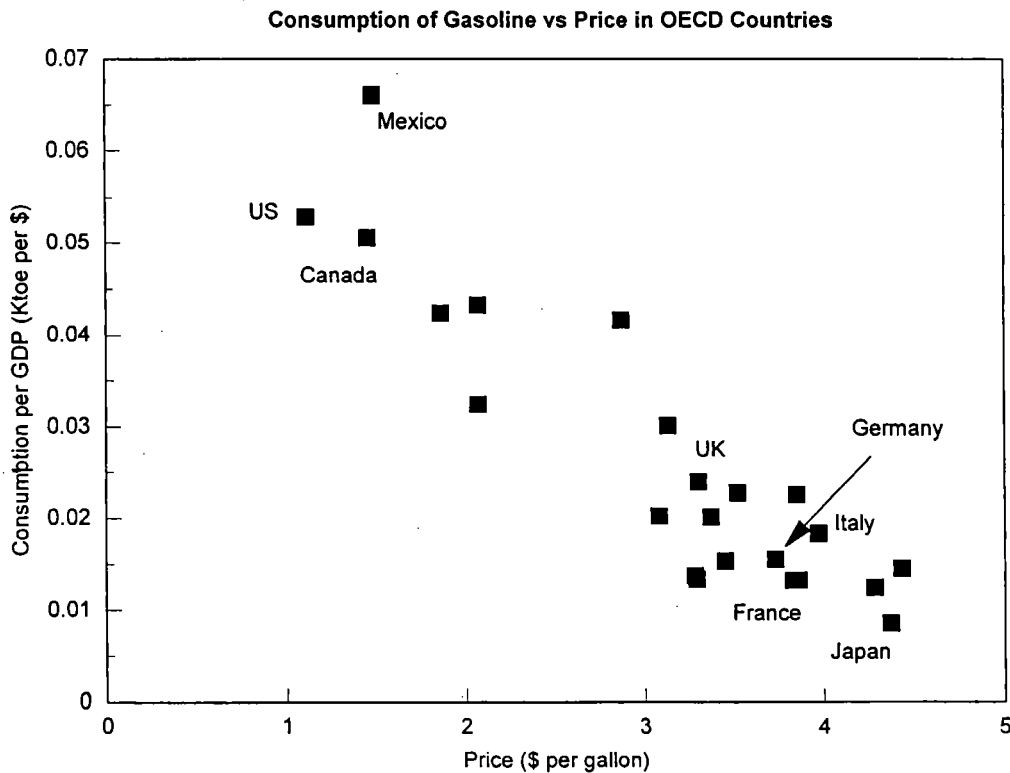
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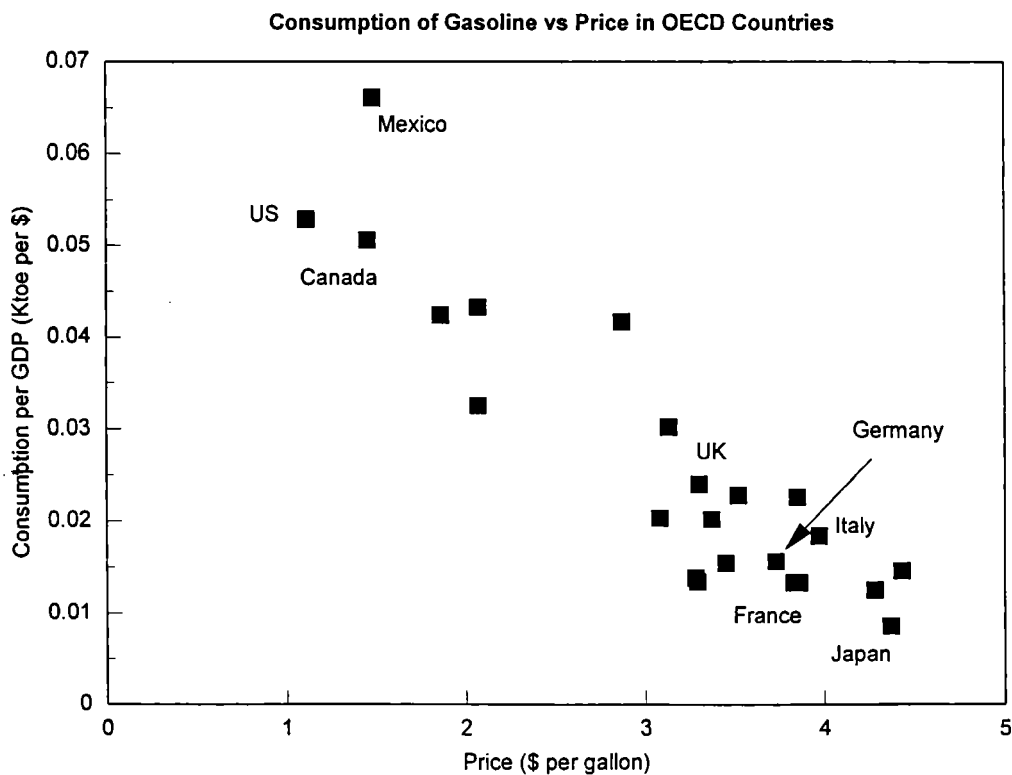
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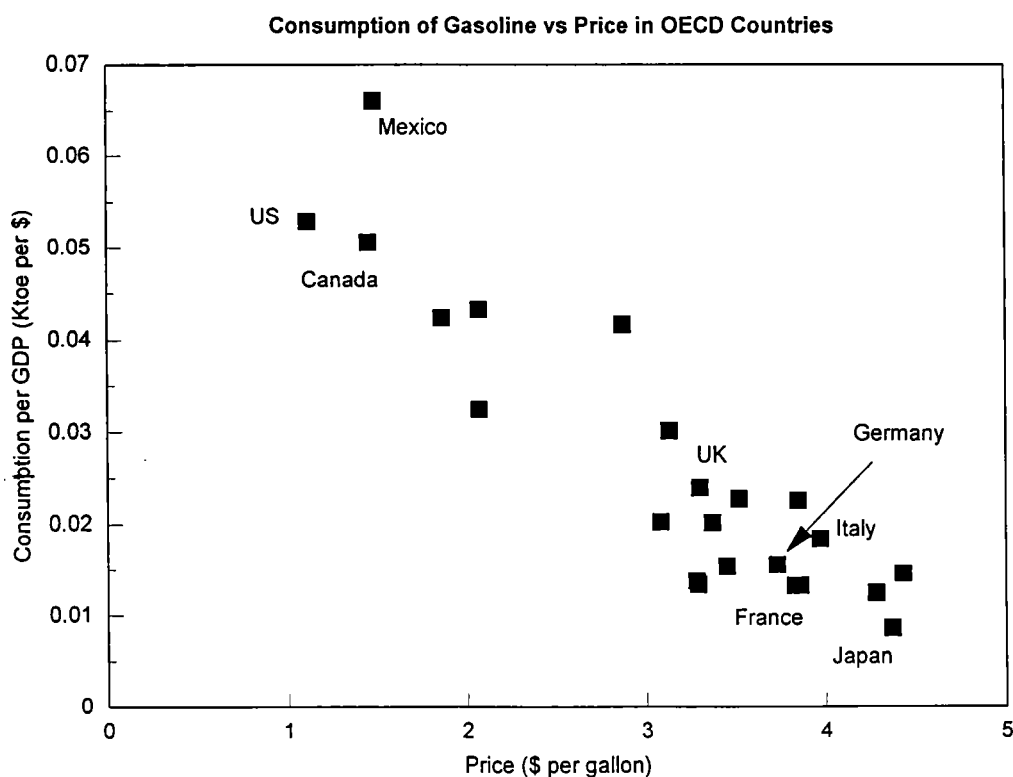
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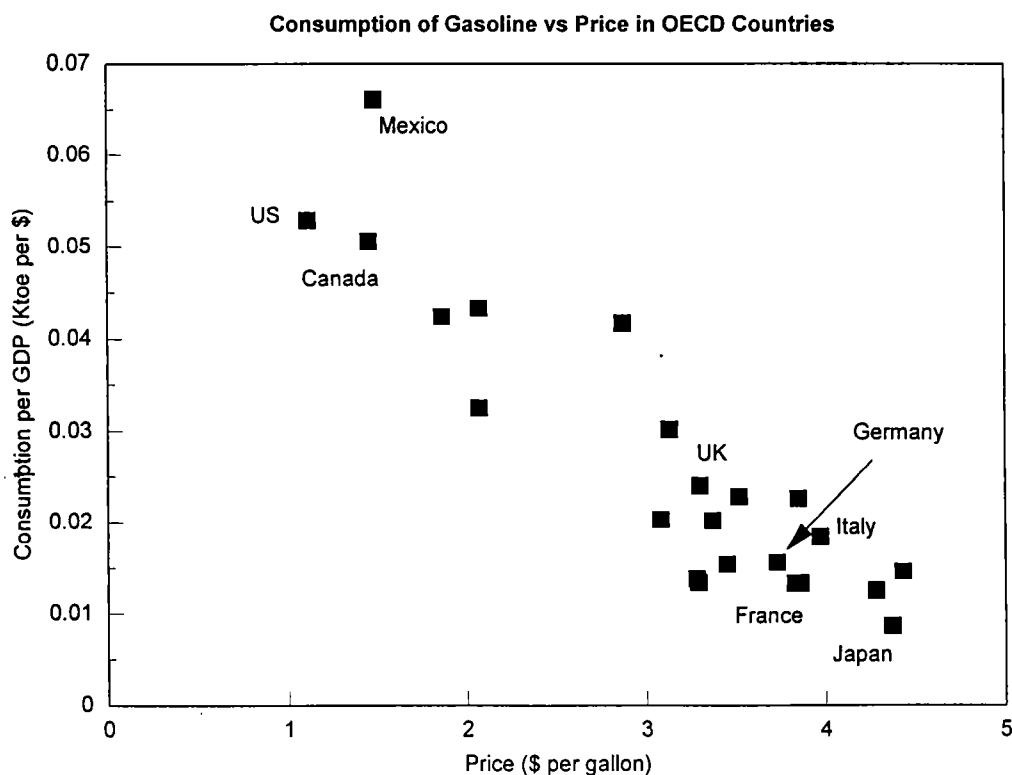
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	10% Increase over 1990			1990 Levels			10% Reduction from 1990		
	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper
Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

Note: A large class of "bottom-up engineering" models emphasize the existence of energy-saving technologies that could save money if implemented (e.g., "green" light bulbs). An influential 1991 study from O.T.A. showed that emissions could be reduced in this way as much as 25%. Consumer irrationality, poor access to information, or very high discount rates are invoked to explain why these technologies are not currently used more widely. To the extent that specific policies can be implemented to overcome these market imperfections, bottom-up models suggest that some reduction in energy usage could be accomplished without raising the price of energy. The key here, however, is identifying specific policies. Empirical evidence suggests that countries that use energy-saving technology tend to be those with high energy prices (see table and graph on next page).

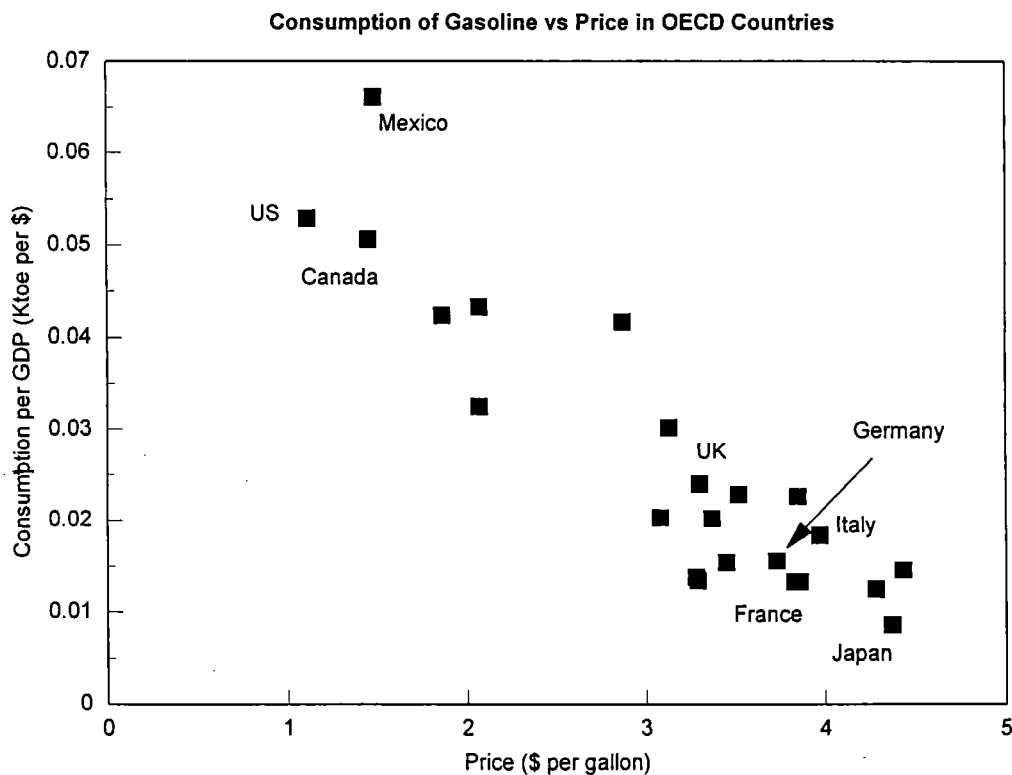
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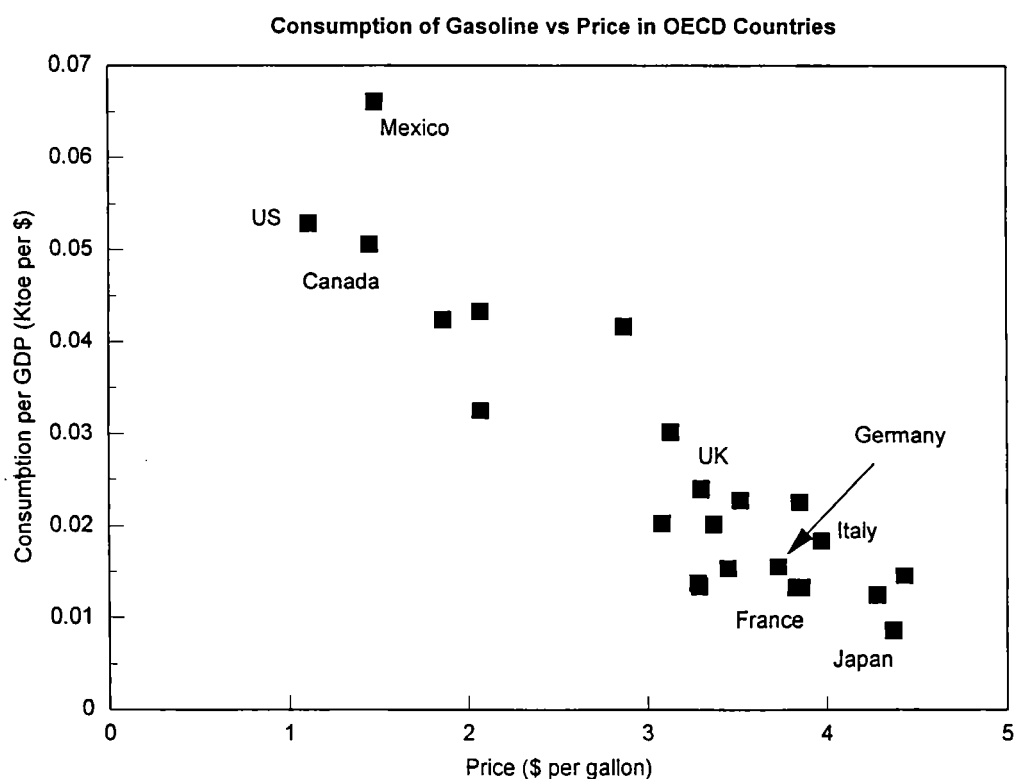
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Gemini	Decision Focus, Inc.	Equilibrium ✓
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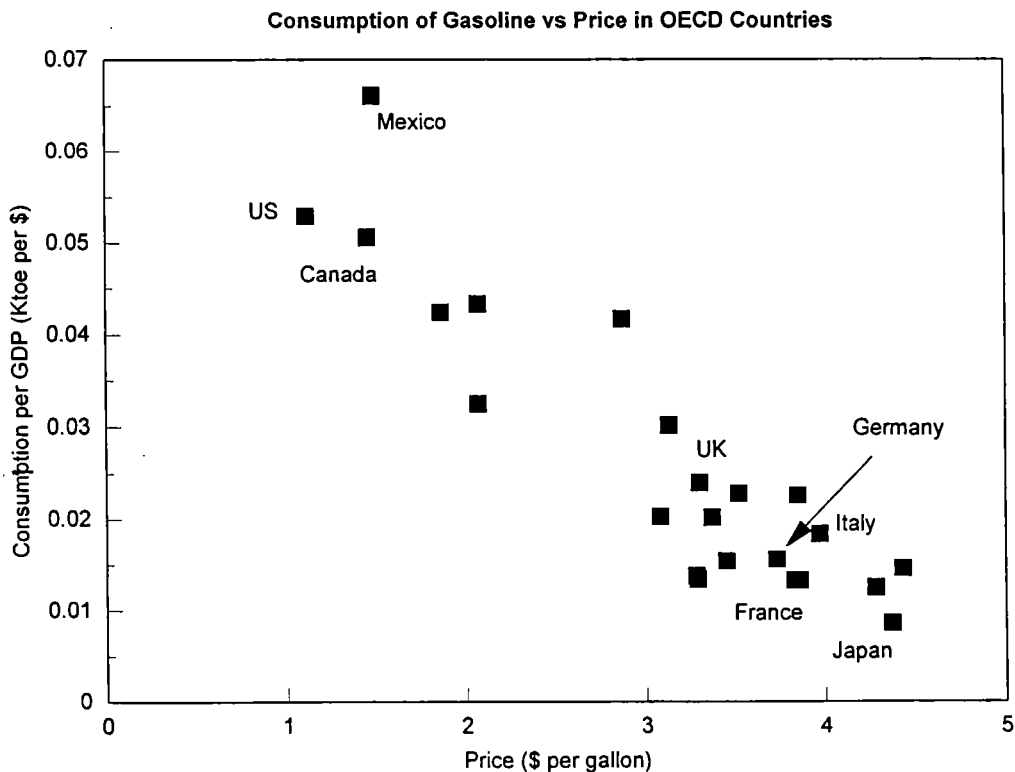
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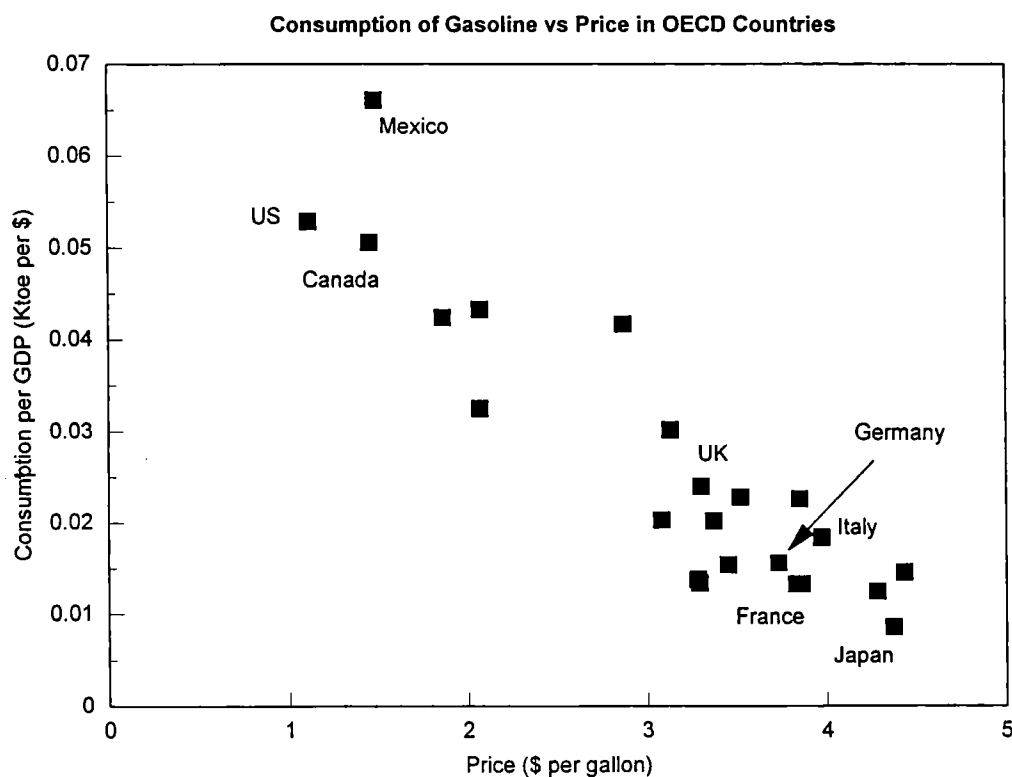
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GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

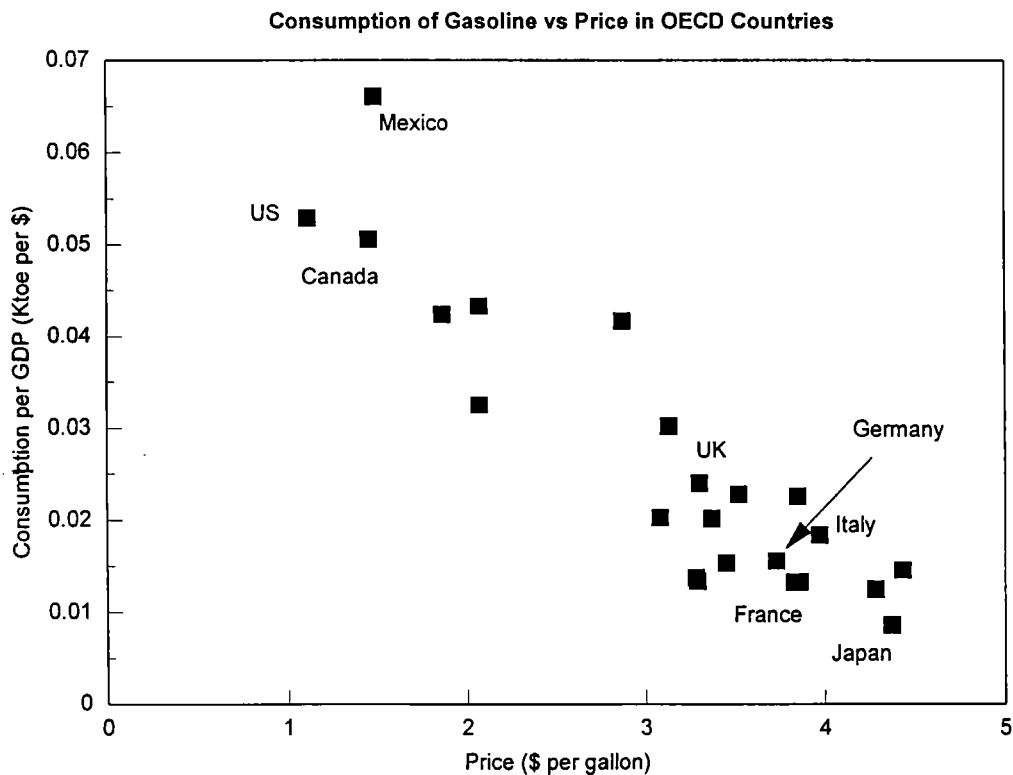
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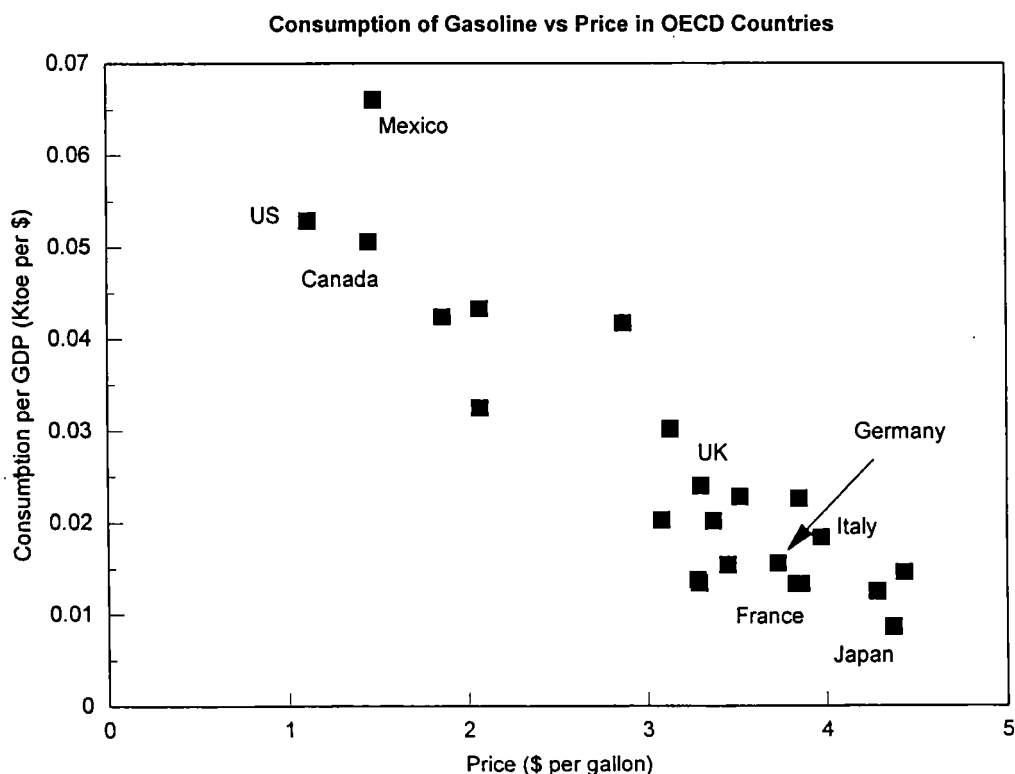
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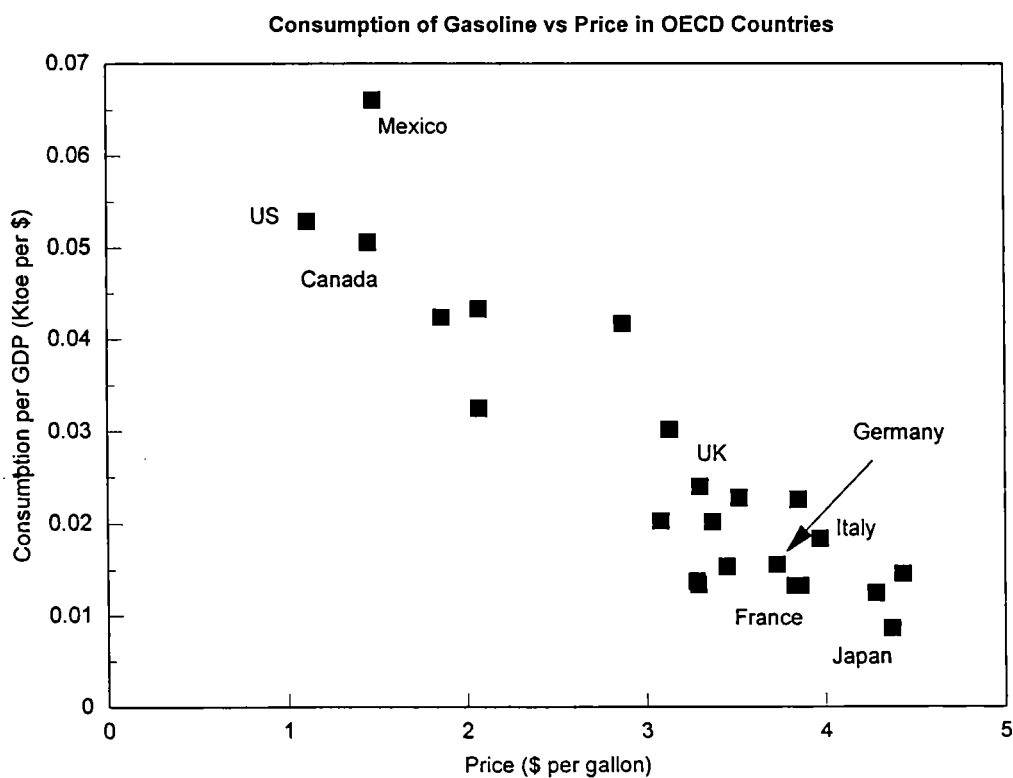
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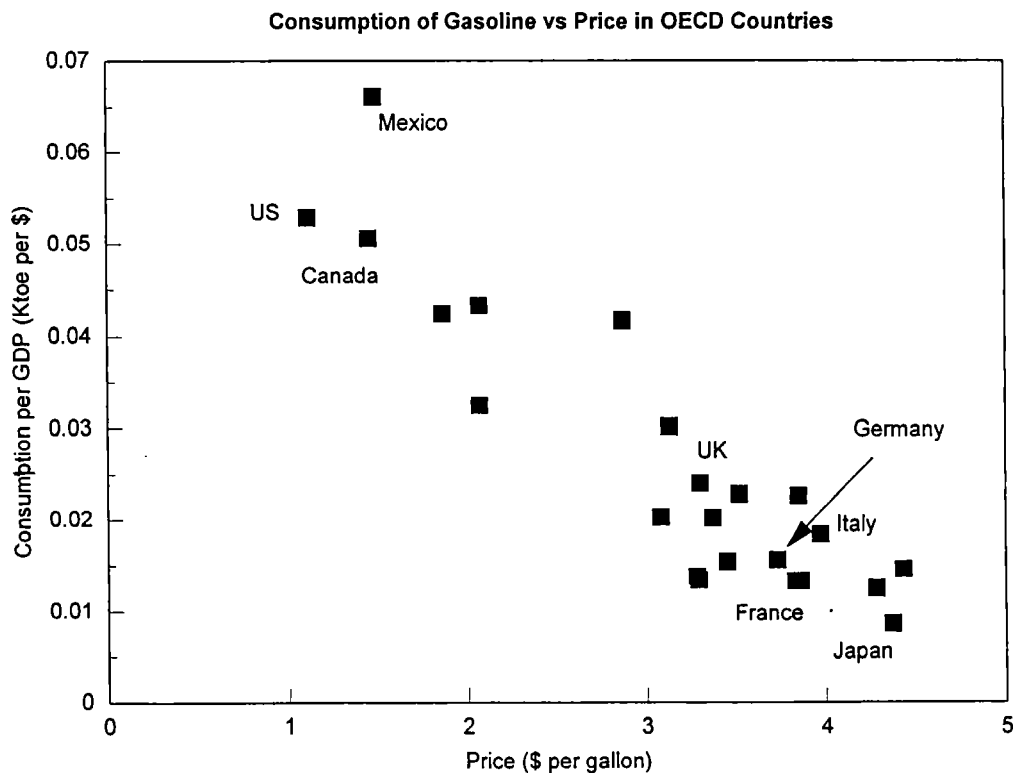
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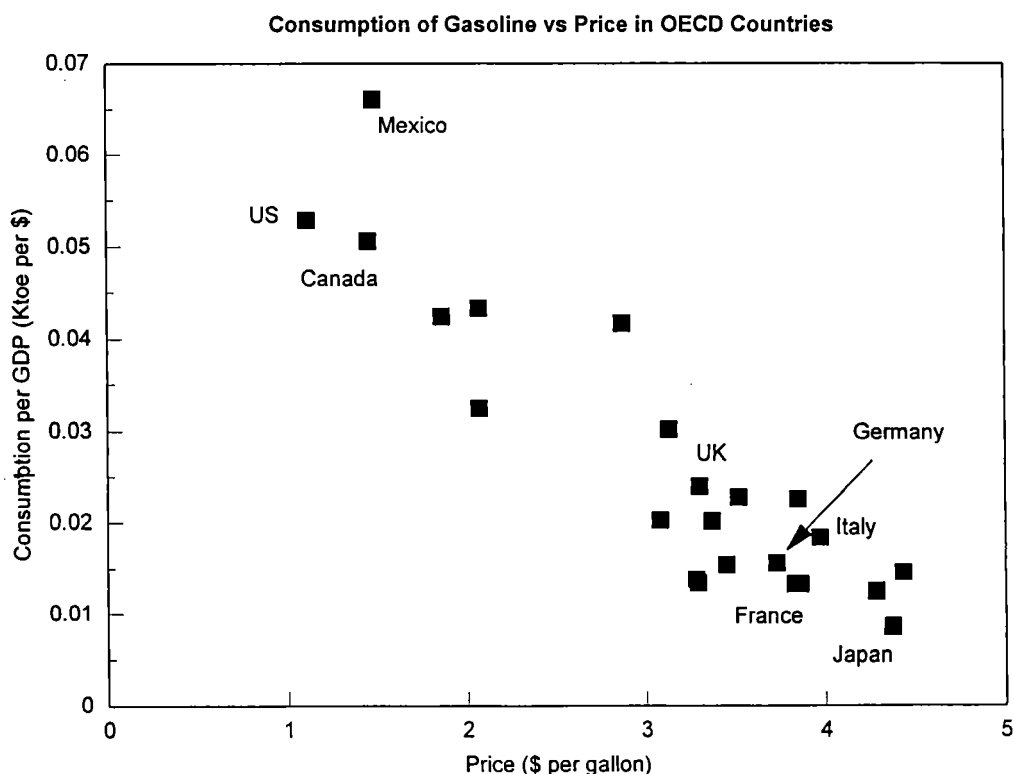
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"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
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"Price"* (% decrease)				5%	20%	29%			
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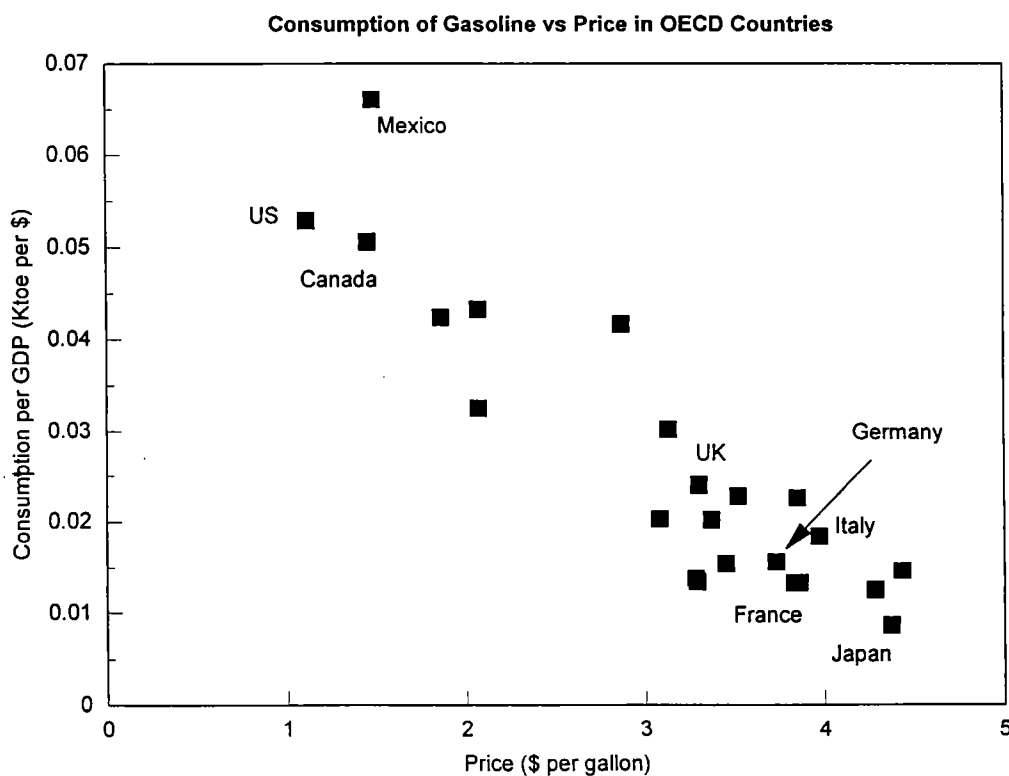
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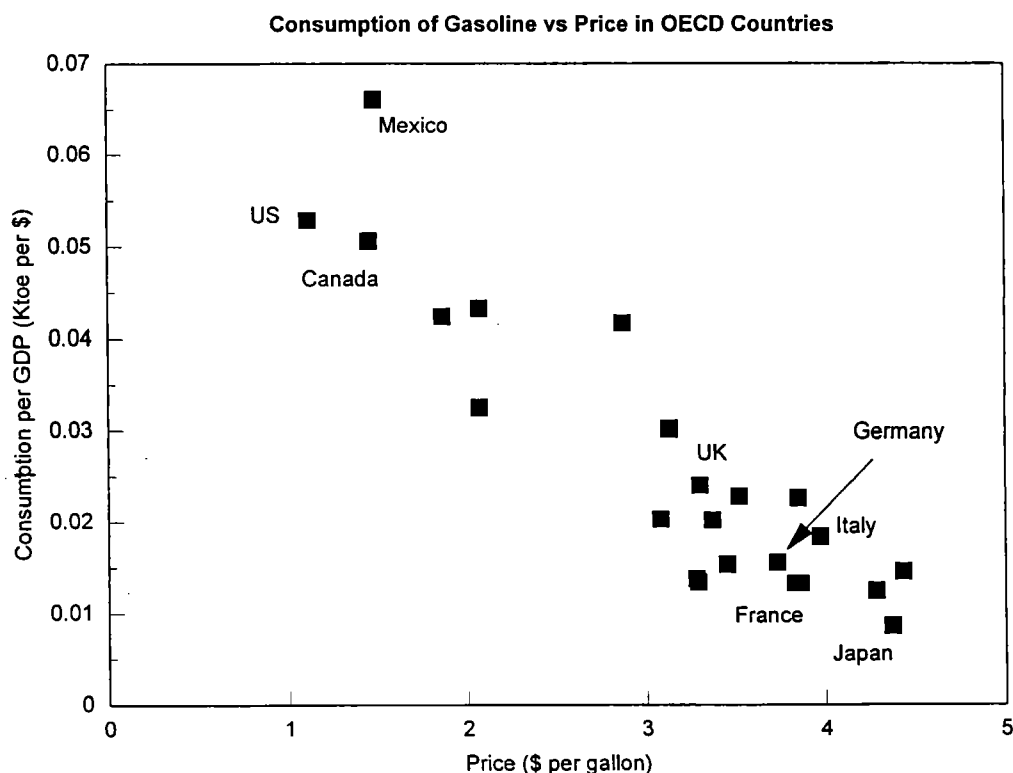
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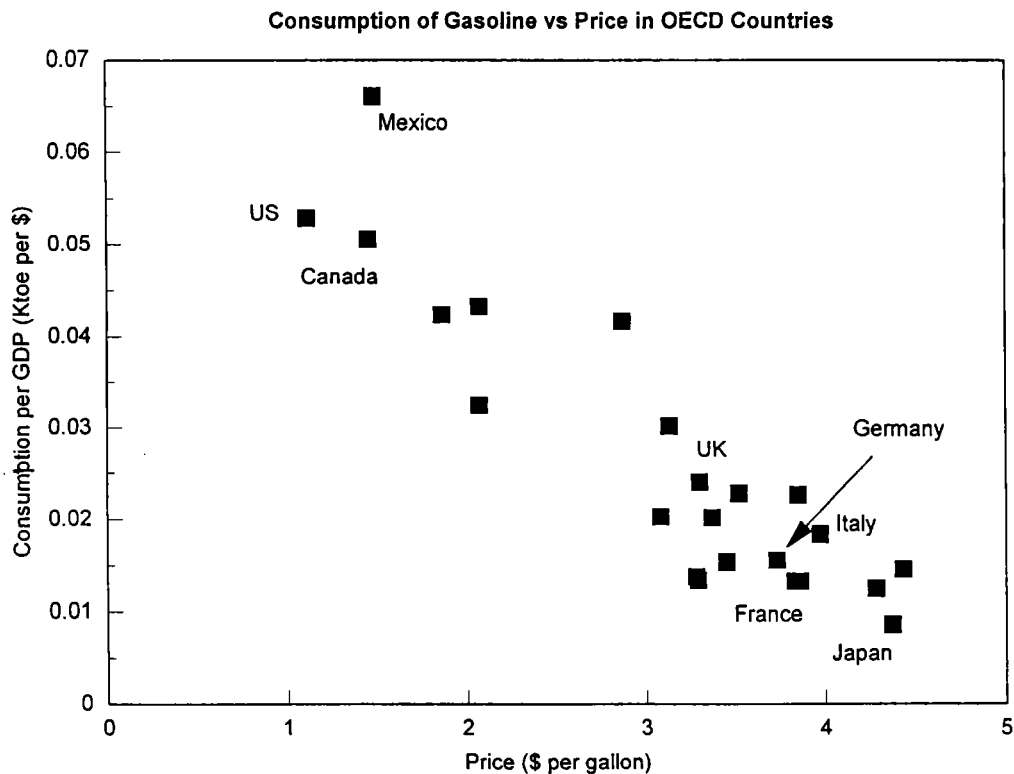
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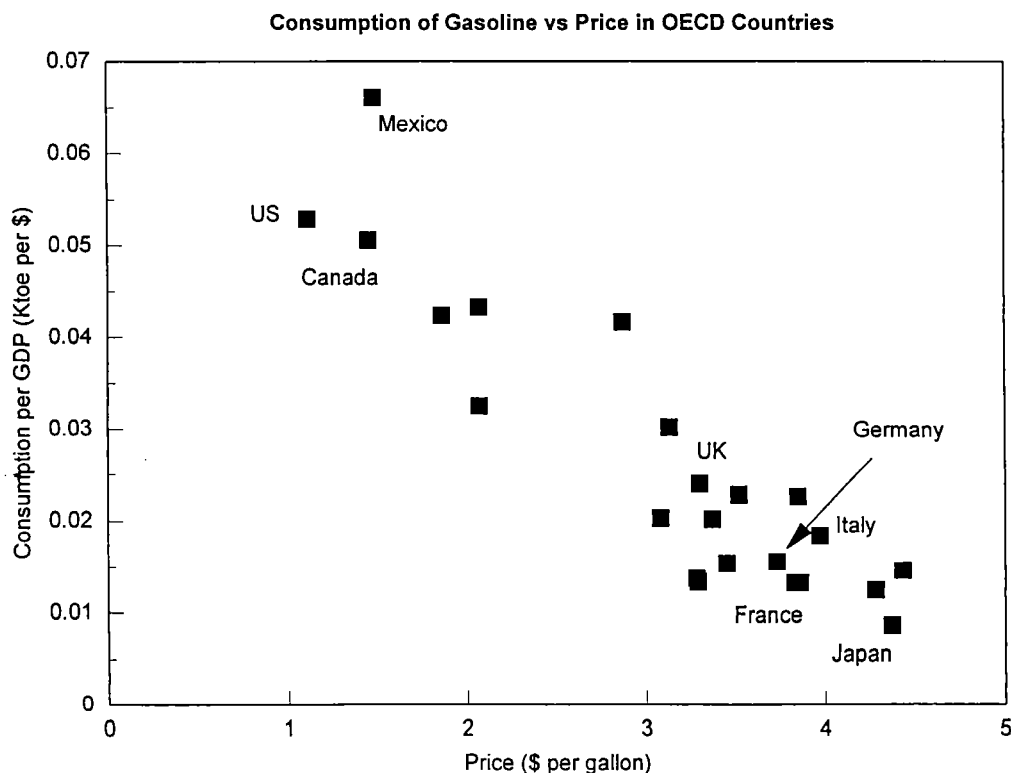
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	Tax (per gallon)	Price (per gallon)	Consumption/GDP (Ktoe per \$)	Price of Electricity: Households (per toe)	Total Energy Consumption/GDP (Ktoe per \$)
Netherlands	\$3.25	\$4.28	0.0125	\$1,343	0.1645
France	\$3.09	\$3.83	0.0133	\$1,744	0.1193
Italy	\$3.02	\$3.97	0.0184	\$1,907	0.1180
Germany	\$2.89	\$3.73	0.0156	\$2,072	0.1184
UK	\$2.50	\$3.30	0.0240	\$1,428	0.1547
Japan	\$2.11	\$4.37	0.0086	\$2,901	0.0733
Spain	\$2.11	\$3.08	0.0203	\$2,023	0.1394
Canada	\$0.73	\$1.45	0.0506	\$692	0.3175
U.S.	\$0.38	\$1.11	0.0529	\$977	0.2068
Mexico	\$0.14	\$1.48	0.0661	\$788	0.2680



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Goulder	Goulder	Equilibrium
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	<u>Less Ambitious Goal</u>			<u>Moderate Goal</u>			<u>More Ambitious Goal</u>		
	10% Increase over 1990			1990 Levels			10% Reduction from 1990		
	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper
Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

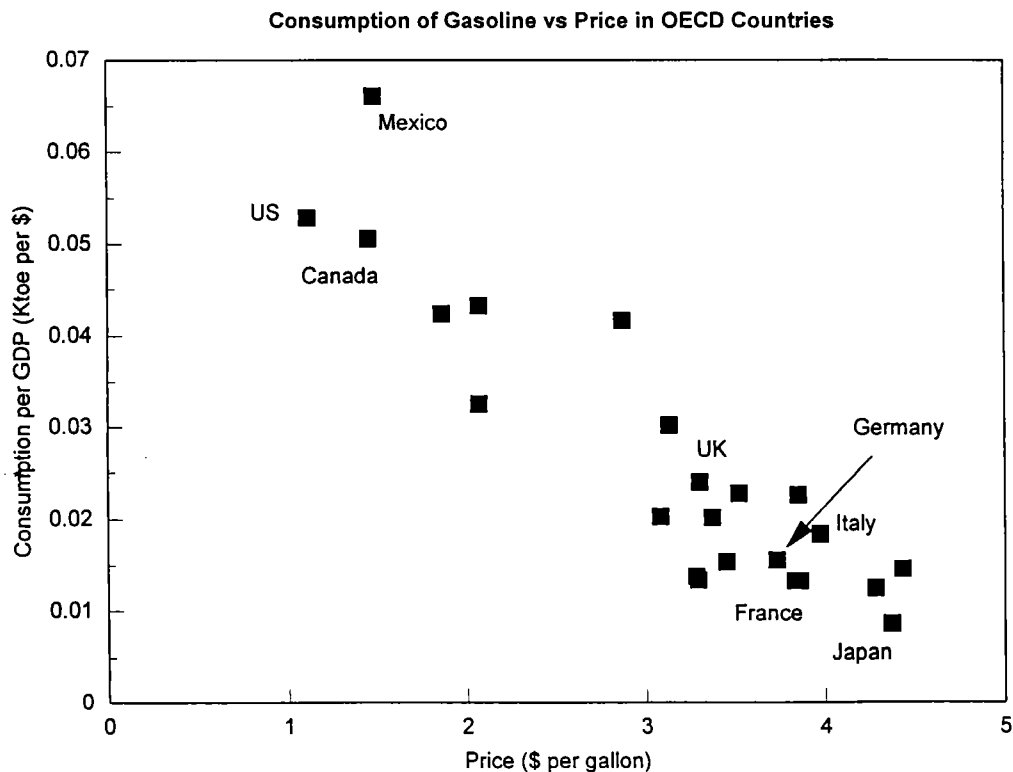
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By what year?

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US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

assume trading in the US.

it's 30% in coal

cheapest full world trading but initial allocation based on GDP (not population)

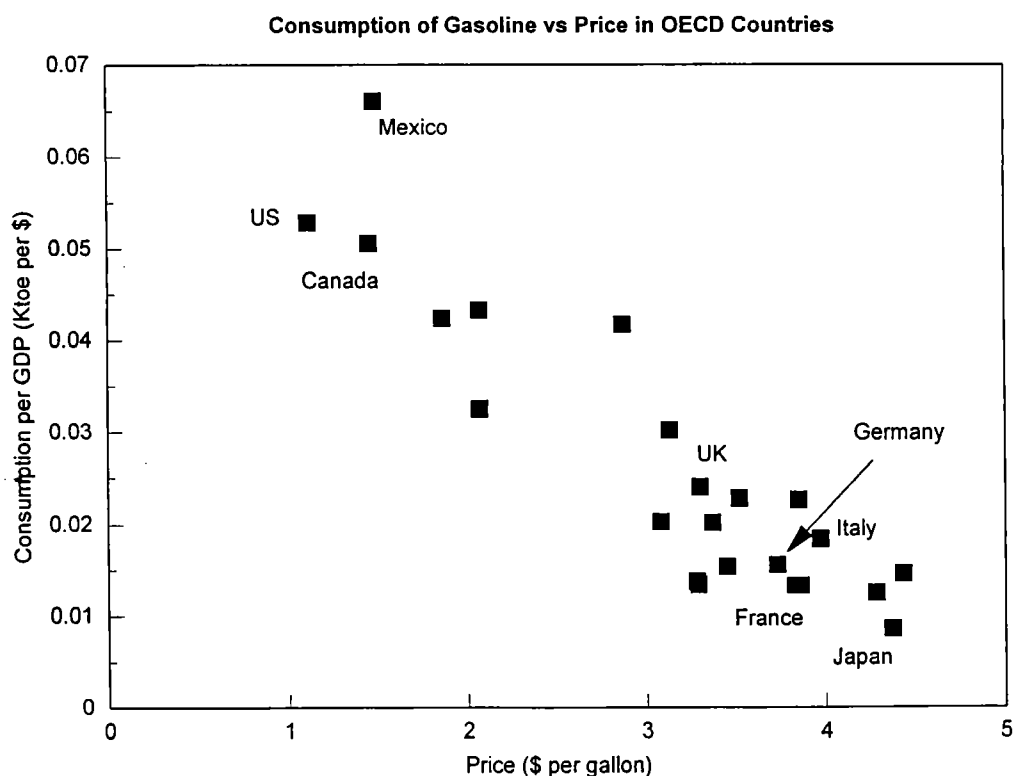
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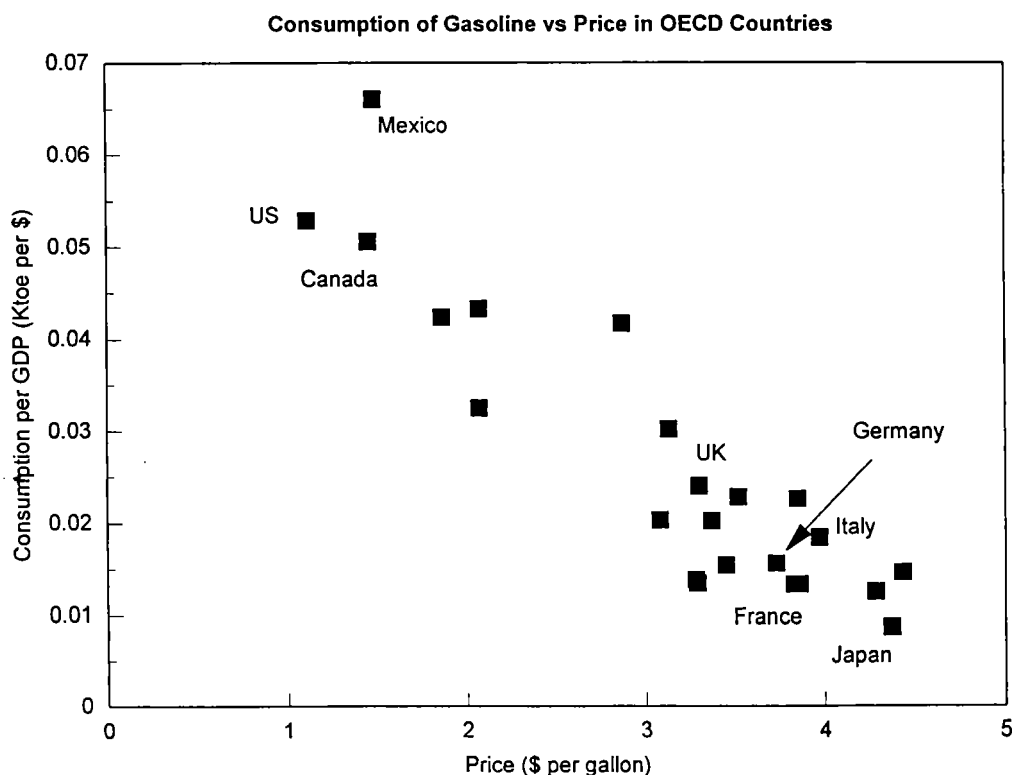
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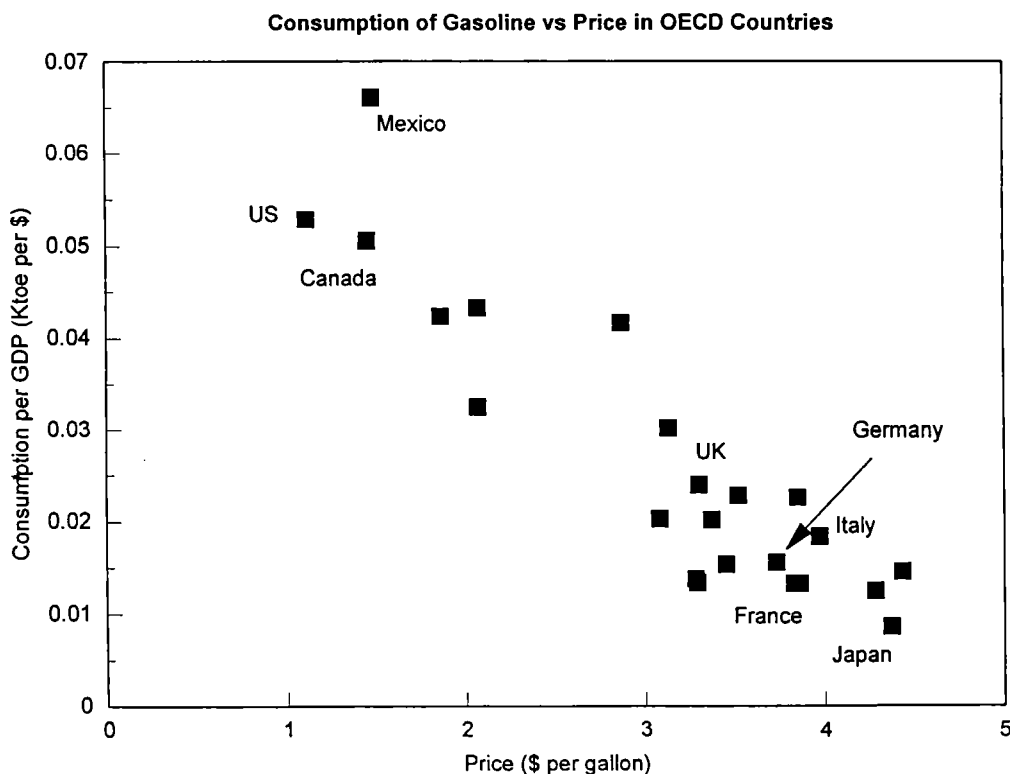
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	10% Increase over 1990			1990 Levels			10% Reduction from 1990		
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Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
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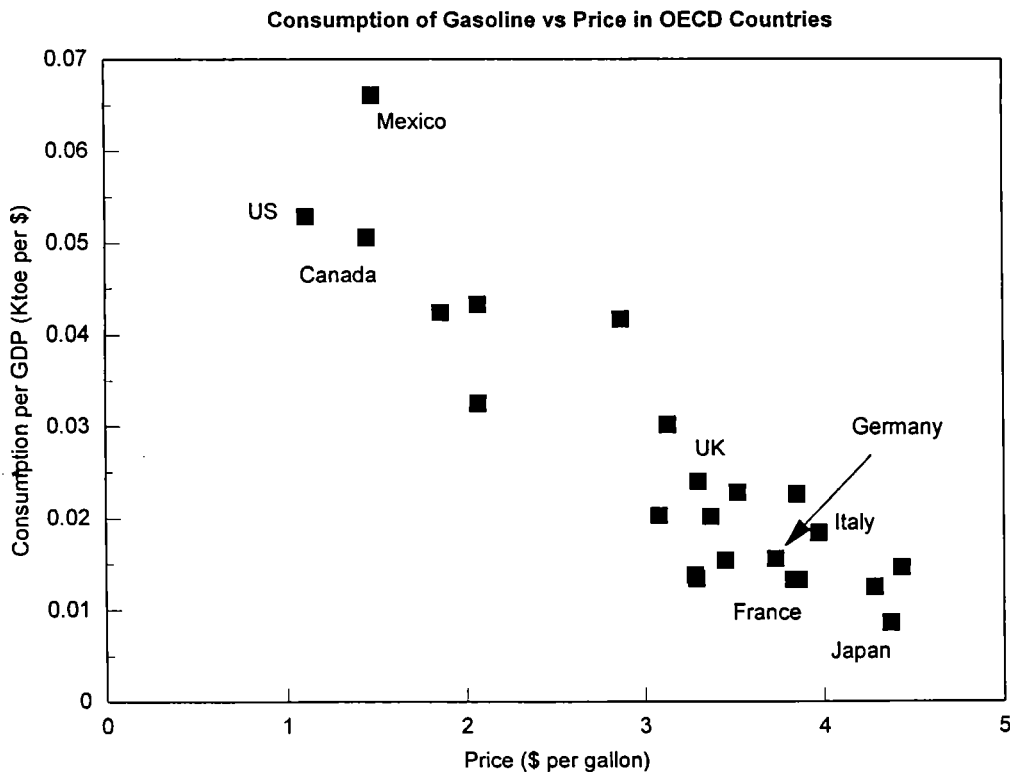
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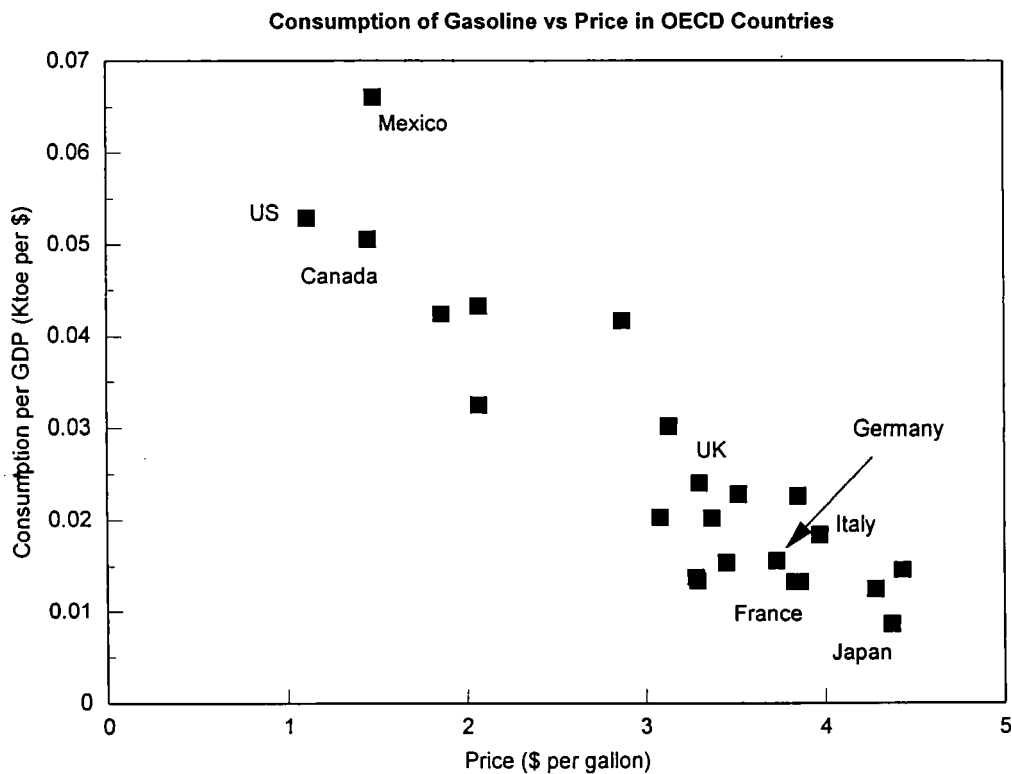
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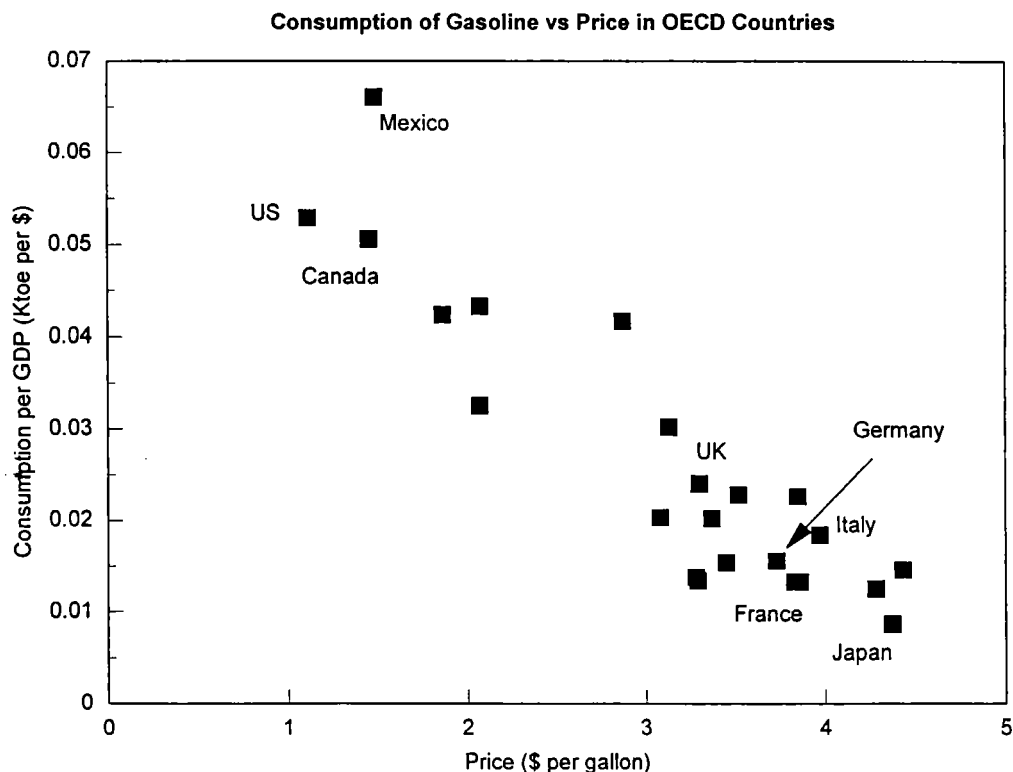
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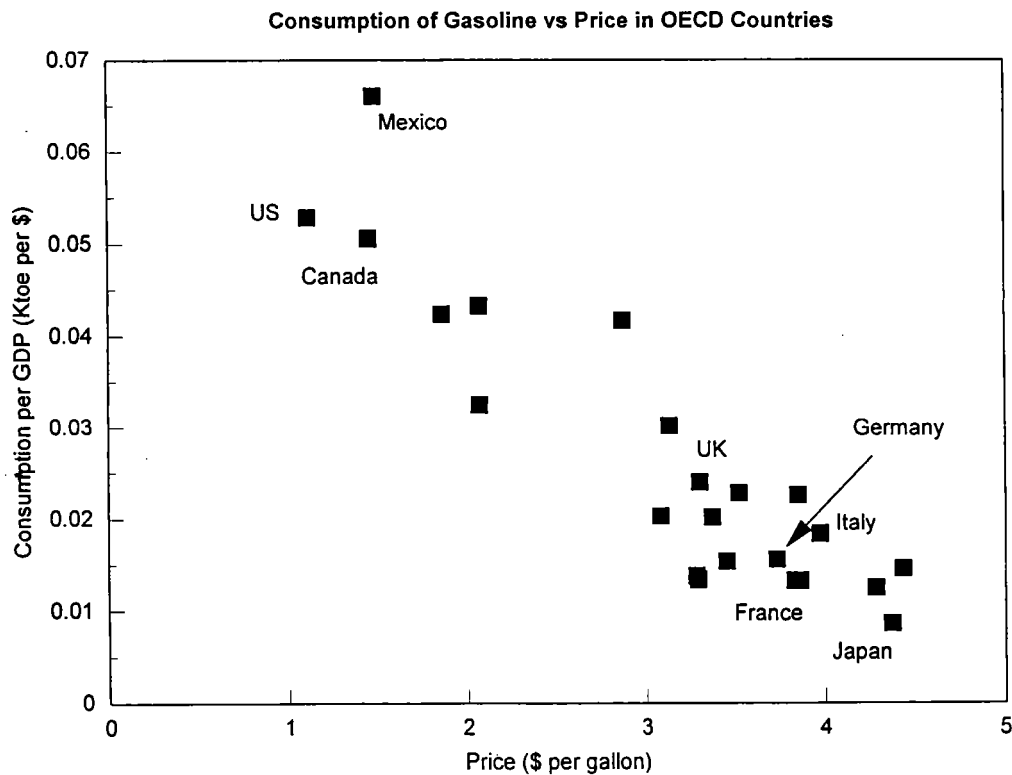
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	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper
Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

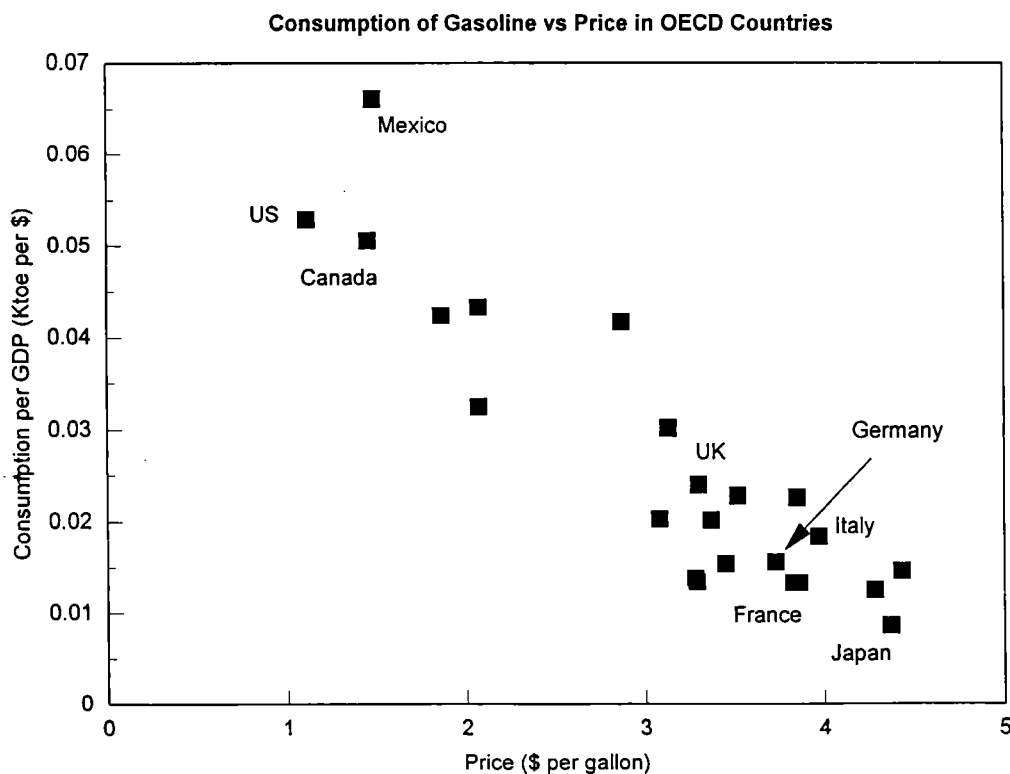
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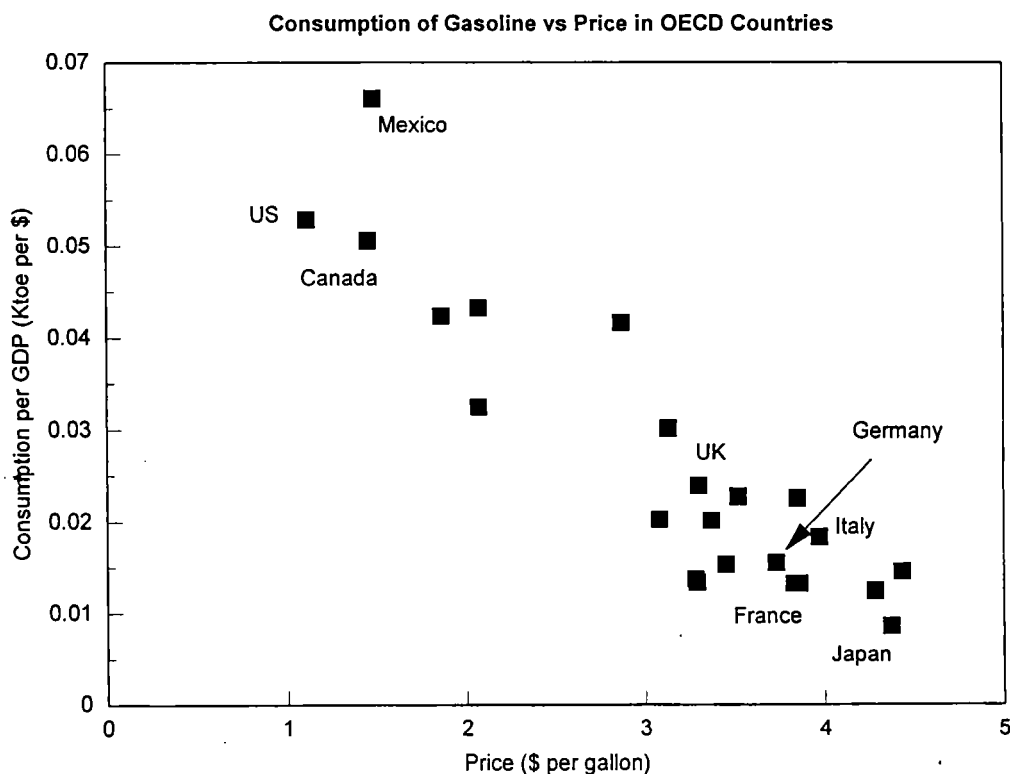
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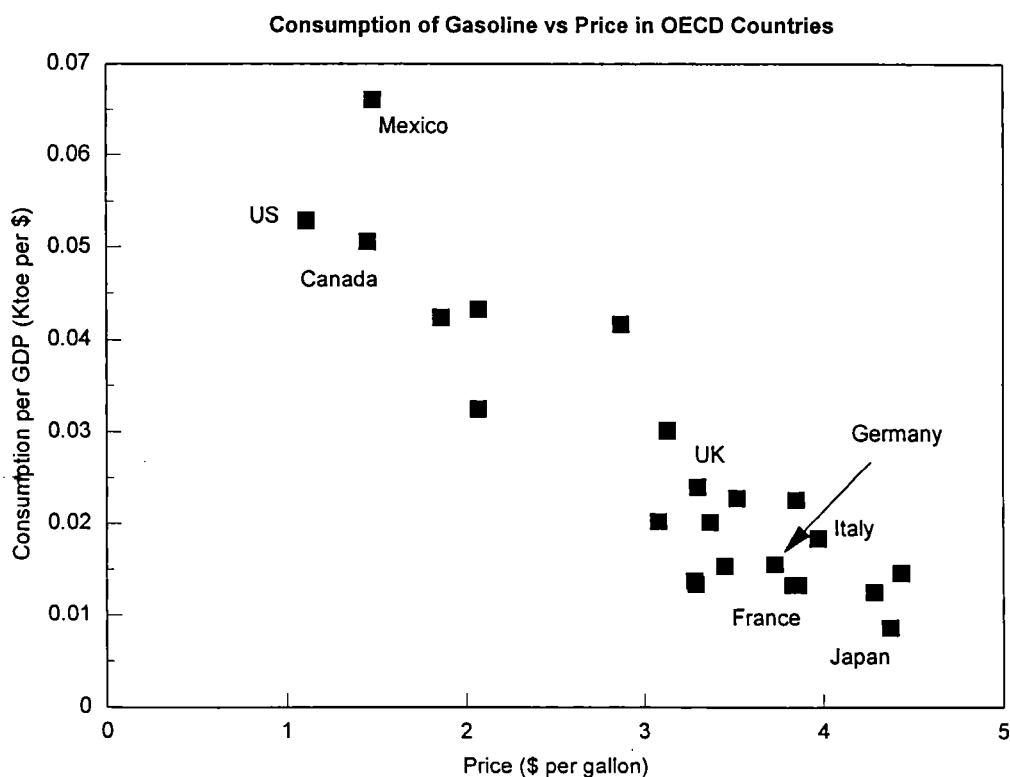
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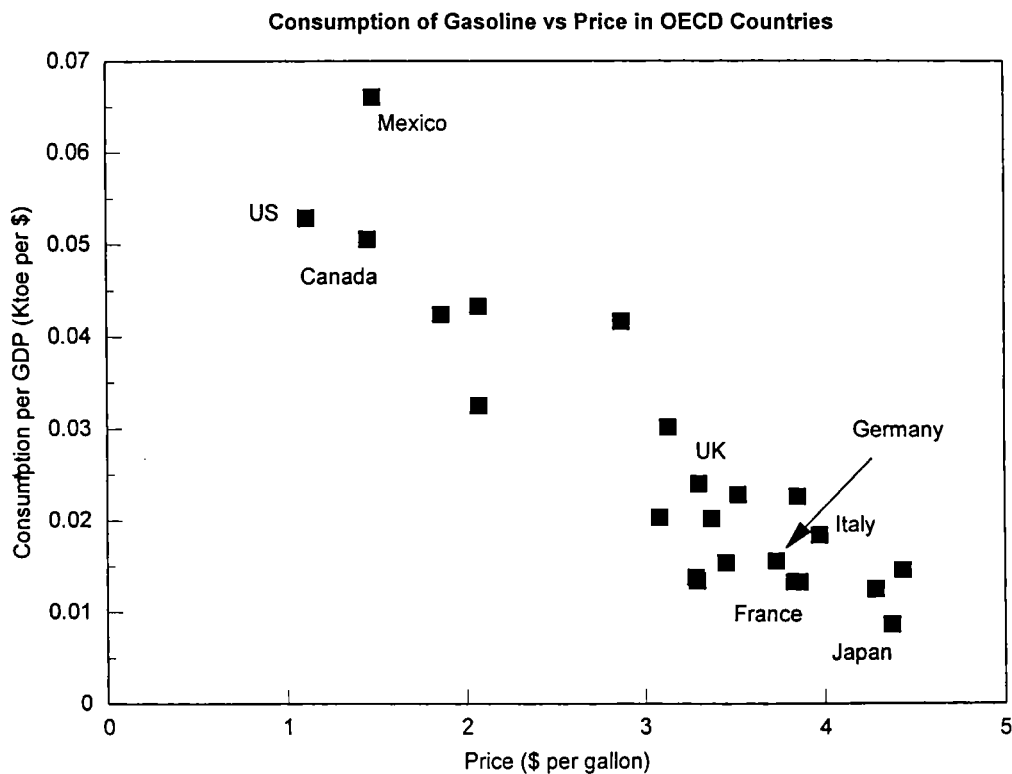
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	10% Increase over 1990			1990 Levels			10% Reduction from 1990		
	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper
Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

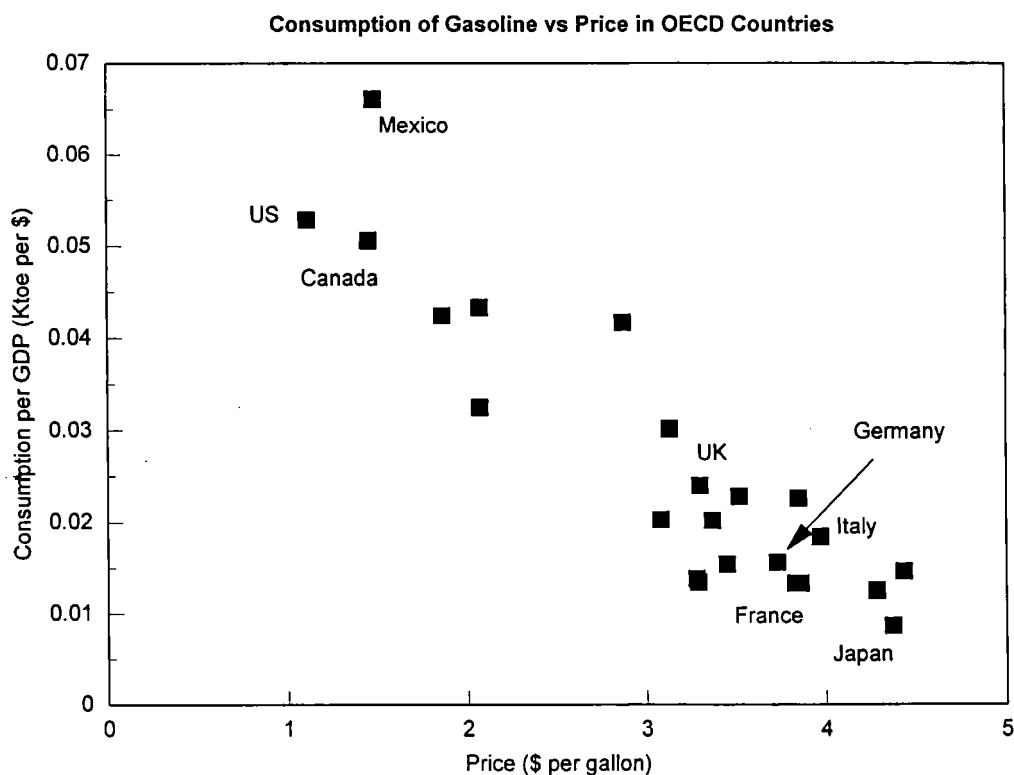
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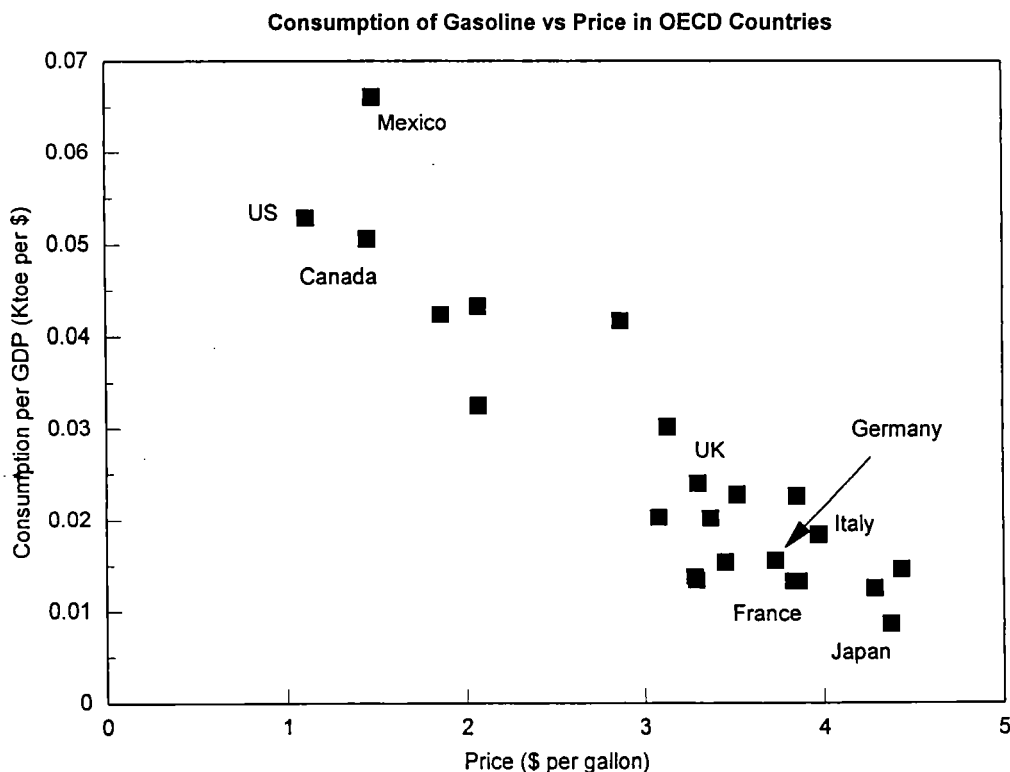
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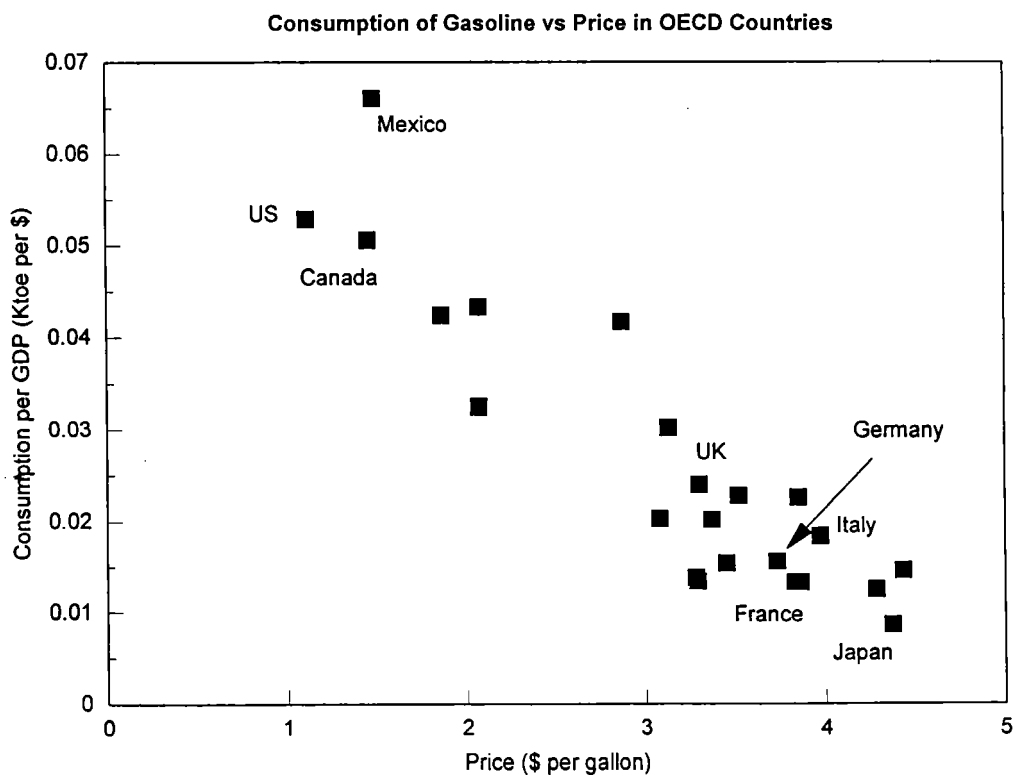
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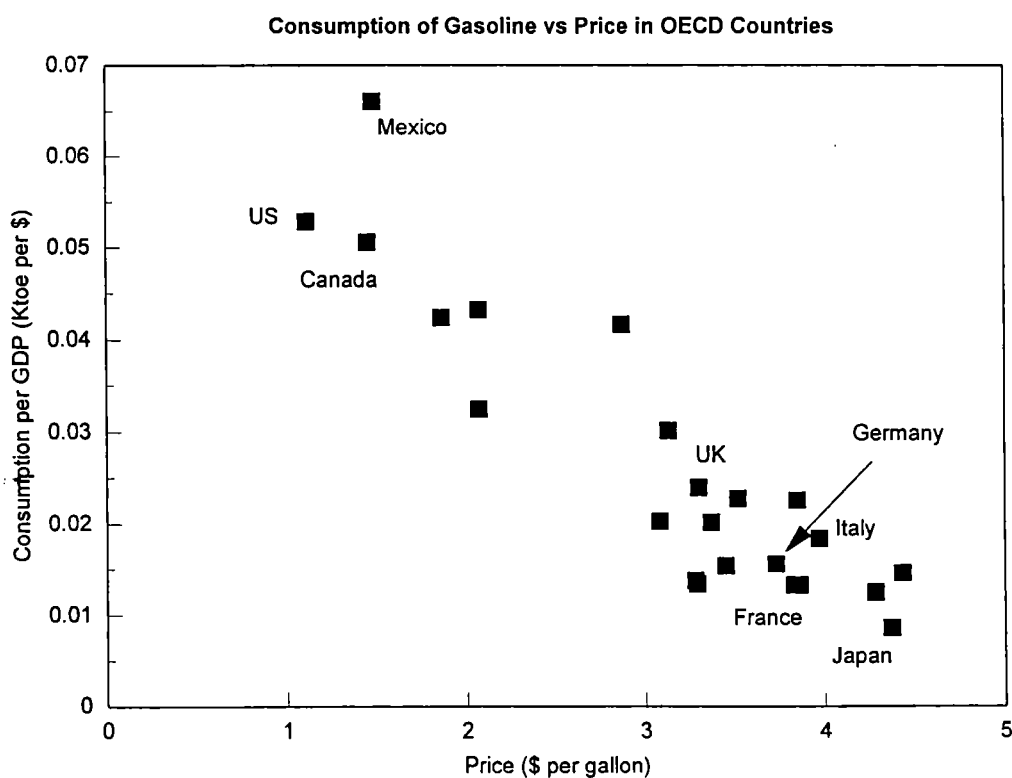
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Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
Coal (per ton, current price=\$28)	\$7	\$34	\$89	\$17	\$55	\$144	\$23	\$93	\$188
GDP Loss (% in 2020)	0.1%	0.2%	0.5%	0.3%	0.6%	1.3%	0.6%	0.9%	1.8%
Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
GDP Change (percentage point)				na	na	na			
Gains Relative to Base Case: Tradable Permits w/ World (4 Models)									
"Price"* (% decrease)				5%	20%	29%			
GDP Change (percentage point)				0.1%	0.1%	0.3%			
US Transfers** (% of GDP)				-0.2%	-0.7%	-1.7%			

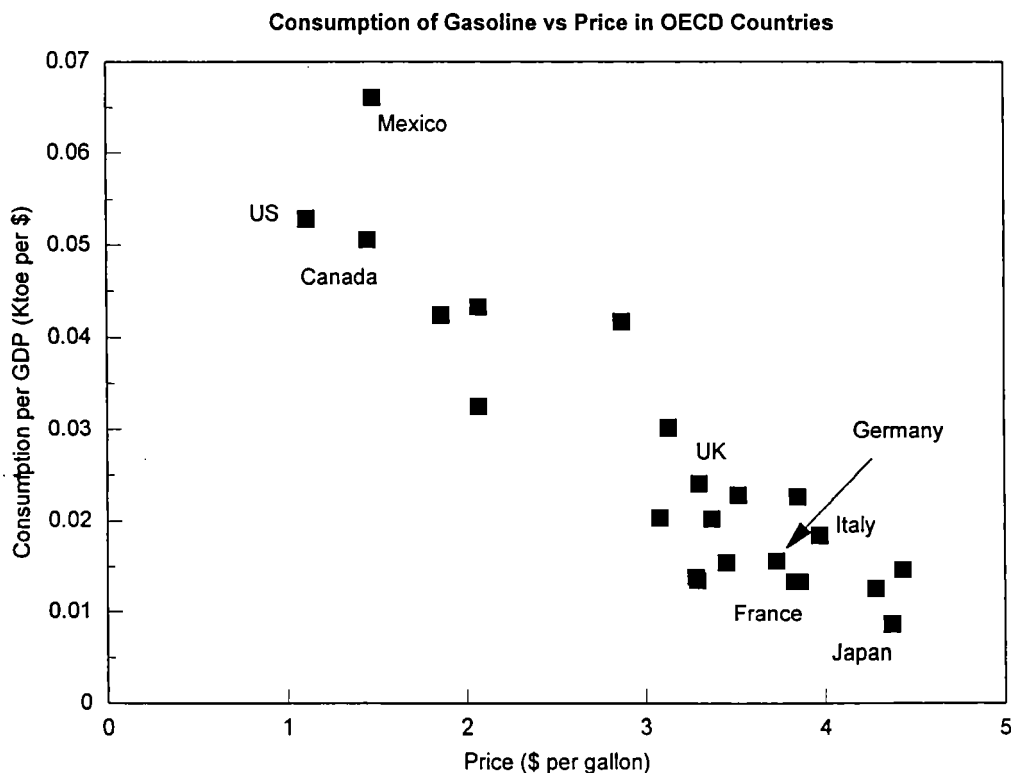
Note: A large class of "bottom-up engineering" models emphasize the existence of energy-saving technologies that could save money if implemented (e.g., "green" light bulbs). An influential 1991 study from O.T.A. showed that emissions could be reduced in this way as much as 25%. Consumer irrationality, poor access to information, or very high discount rates are invoked to explain why these technologies are not currently used more widely. To the extent that specific policies can be implemented to overcome these market imperfections, bottom-up models suggest that some reduction in energy usage could be accomplished without raising the price of energy. The key here, however, is identifying specific policies. Empirical evidence suggests that countries that use energy-saving technology tend to be those with high energy prices (see table and graph on next page).

* Based on the change in the shadow price of carbon. The ultimate market clearing price change will depend on the elasticity of supply and demand.

** Assumes that permits are distributed according to 1990 population shares.

Price and Consumption of Energy in The Ten Largest OECD Countries (1994)

	Gasoline			Other Energy	
	Tax (per gallon)	Price (per gallon)	Consumption/GDP (Ktoe per \$)	Price of Electricity: Households (per toe)	Total Energy Consumption/GDP (Ktoe per \$)
Netherlands	\$3.25	\$4.28	0.0125	\$1,343	0.1645
France	\$3.09	\$3.83	0.0133	\$1,744	0.1193
Italy	\$3.02	\$3.97	0.0184	\$1,907	0.1180
Germany	\$2.89	\$3.73	0.0156	\$2,072	0.1184
UK	\$2.50	\$3.30	0.0240	\$1,428	0.1547
Japan	\$2.11	\$4.37	0.0086	\$2,901	0.0733
Spain	\$2.11	\$3.08	0.0203	\$2,023	0.1394
Canada	\$0.73	\$1.45	0.0506	\$692	0.3175
U.S.	\$0.38	\$1.11	0.0529	\$977	0.2068
Mexico	\$0.14	\$1.48	0.0661	\$788	0.2680



Sources: Energy Prices and Taxes: Second Quarter 1996; International Energy Agency (IEA); OECD
Energy Statistics of OECD Countries: 1993-1994; IEA; OECD
OECD in Figures: Statistics of the Member Countries (1996 Edition)

Appendix: Carbon Abatement Studies

The following list is organized from lowest to highest carbon tax required for reduction to 1990 levels. There are several results for each model in the literature. For the base case scenario, we used the result which most closely matched the scenarios in which we are interested. Some interpolations and extrapolations were used to fill out the table, although we made every effort to stay as close as possible to published numbers. Some results assumed reductions by 2010. Gains relative to base case were calculated using results from within a single model reported in the same paper (so that other assumptions are unchanged). Results reported are from the following models:

<u>MODEL</u>	<u>AUTHOR</u>	<u>TYPE</u>
DGEM	Jorgenson/Wilcoxon	Equilibrium
Global Macro	ICF, Inc.	Equilibrium
Goulder	Goulder	Equilibrium
Green	OECD	Equilibrium
Fossil2	AES Corporation	Equilibrium
MWC	Mintzer/Schaper	Equilibrium
ERM	Edmond/Reilly	Equilibrium
Oxford	Walker/Rossi/Cooper	Macroeconomic
Gemini	Decision Focus, Inc.	Equilibrium
Global 2100	Manne/Richels	Equilibrium
DRI	McGraw-Hill	Macroeconomic
CRTM	Rutherford	Equilibrium

Sources

Dean, Andrew and Peter Hoeller (1992), "Costs of Reducing CO₂ Emissions: Evidence from Six Global Models," *OECD Economic Studies*, No. 19.

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Estimated Implications for Carbon Emissions Abatement by 2020: A Literature Review

Forcing a large number of disparate models into such a simple table as this necessarily does violence to some of them; many issues of comparability and choice of assumptions have been swept under the rug, and modelers might not all agree with how their results are presented. The table is a work in progress. Nevertheless, the range of variation in the results reported here gives an idea of the range of variation in the literature.

	<u>Less Ambitious Goal</u>			<u>Moderate Goal</u>			<u>More Ambitious Goal</u>		
	10% Increase over 1990			1990 Levels			10% Reduction from 1990		
	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper
Base Case: No Internationally Tradable Permits (12 models)									
Change in "Price"*									
Carbon (per ton)	\$10	\$50	\$133	\$25	\$82	\$215	\$35	\$139	\$280
Gasoline (per gallon)	\$.03	\$.13	\$.35	\$.07	\$.22	\$.57	\$.09	\$.37	\$.75
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Gains Relative to Base Case: Tradable Permits w/ OECD (1 Model)									
"Price"* (% decrease)				na	6%	na			
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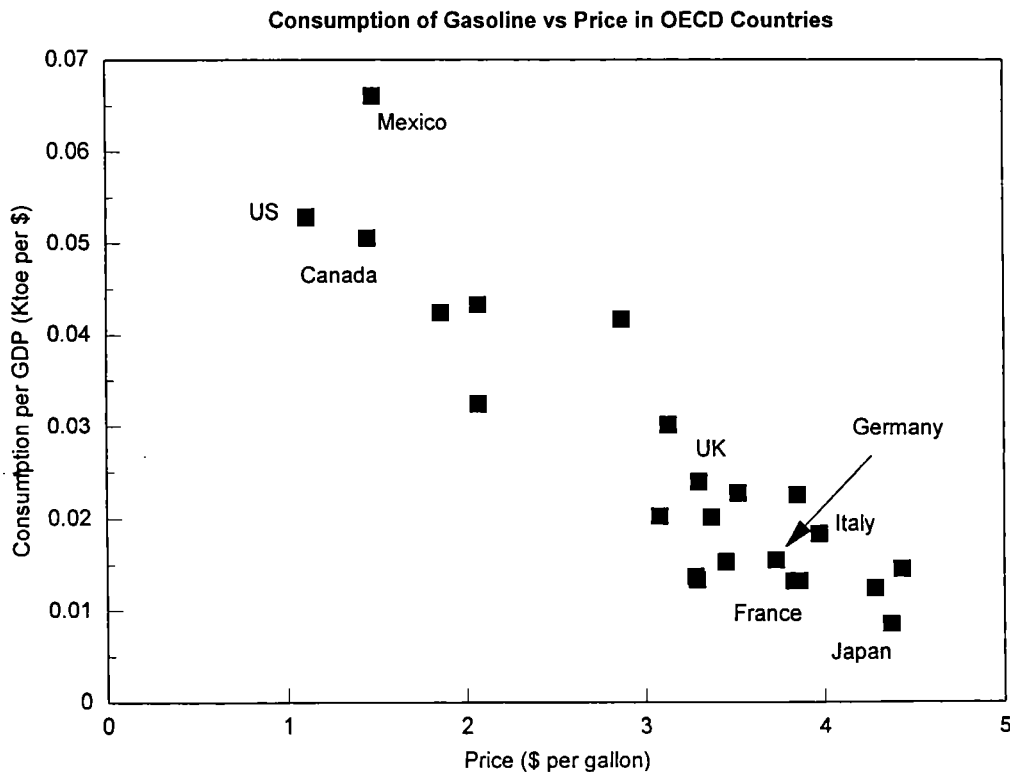
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