ASSESSING THE ECONOMIC COST OF
US OIL CONSERVATION

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ABSTRACT

This article examines the costs of U.S. oil conservation by using parameters from five world oil models used in a recent Energy Modeling Forum study. Variation in the estimated cost of oil conservation across the models suggests that achieving oil conservation through flexible policies that adjust to market conditions would better serve economic efficiency than setting government-mandated levels of oil consumption. The analysis also finds net world oil conservation is likely to be somewhat less than gross U.S. conservation; U.S. oil conservation lowers the world oil price and stimulates non-U.S. oil consumption. When the gains in non-U.S. oil consumption are taken into account, the estimated costs of achieving a given level of conservation are higher.

I. INTRODUCTION

In recent years, increasing attention to global environmental problems, energy security, and declining U.S. oil production have revived calls for energy conservation. The benefits and costs of energy conservation remain controversial. Hall (1990, 1992) has provided comprehensive estimates of the externality costs associated with energy consumption. Others, such as Brown and Phillips (1991), Chandler, et. al. (1988) and the National Academy of Sciences (1991), have provided estimates of the costs of conservation.

Previous cost studies have tended to assess the costs of holding U.S. oil consumption at a predetermined level and/or relied upon a single supply curve of conservation. Cost estimates such as these are greatly affected by the projected growth of oil consumption, as well as individual model parameters. A more general approach is to estimate supply curves of oil conservation using
a range of market conditions represented in different models of the world oil market. Varying estimates permit an assessment of the extent of uncertainty about the cost of conservation and are helpful in determining whether specific conservation policies serve economic efficiency.

One of the unintended effects of U.S. oil conservation may be to stimulate gains in oil consumption outside of the United States. Reduced U.S. oil consumption lowers world oil prices and triggers offsetting gains in world oil consumption. As a consequence, net world oil conservation is somewhat less than gross U.S. conservation. International agreements between countries to reduce oil consumption in concert can close the gap between gross and net conservation, but free riding and uneven costs of participation seem to have prevented such agreements. For a large country, such as the United States, however, unilateral oil conservation policies are a realistic possibility.

In identifying efficient policies for unilateral oil conservation, two types of supply curves of conservation bear examination. The first is the marginal cost of gross U.S. conservation. The second is the marginal cost of net world conservation. The latter may be of particular interest when the externalities associated with oil consumption arise primarily from world oil consumption.¹

To estimate supply curves of oil conservation for the United States, we use a three-step process. First, we obtain projected prices and quantities, as well as price elasticities of supply and demand from five world oil market models that participated in the eleventh Energy Modeling Forum study, *International Oil Supplies and Demands*. We then use parameters from each model in simulation analysis to estimate how U.S. oil conservation would affect prices and quantities on the world oil market under a variety of
assumptions. Finally, we combine welfare analysis with our simulation results and the model parameters to derive supply curves of conservation for each of the five models.

II. ANALYTICAL FRAMEWORK

We use parameters from each of five world oil market models described below in a series of simulation analyses to provide multiple estimates of the effects of U.S. oil conservation on prices and quantities on the world oil market. The simulations assume that U.S. oil conservation is achieved through a tax on domestic oil consumption. World oil market conditions determine how much of the tax is borne by U.S. consumers and how much is seen as lower world oil prices. To the extent taxation lowers the world oil price, however, a higher tax is required to achieve any given level of U.S. conservation.

Welfare analysis serves as a basis to provide estimates of the supply (marginal cost) curves of oil conservation. The welfare-theoretic approach has the advantages of being well grounded in economic theory and relatively straightforward to implement and interpret. Assessed at different quantities of conservation, estimates of marginal cost can be combined to provide an estimated supply curve of oil conservation.

A. The Cost of U.S. Conservation

If the reduction of externalities is regarded as the social benefit of oil conservation, then the cost of U.S. conservation can be regarded as the welfare lost (exclusive of externalities) by reducing U.S. oil consumption below its free market quantity. Under this definition of cost, the marginal cost of conservation is the loss in U.S. welfare that results from a marginal reduction in consumption. This relationship can be expressed as:
\[ MC_C = P_d - P_w + \frac{\partial P_w}{\partial Q_C} Q_w \]  

In the above equation \( MC_C \) denotes the marginal cost of conservation, \( P_d \) the after-tax price of oil in the United States, \( P_w \) the world price of oil, \( Q_C \) the quantity of U.S. oil conservation, and \( Q_w \) the quantity of U.S. oil imports.³

If the United States is concerned only with domestic conservation, equation 1 can be used to provide estimates of the cost of conservation. The marginal cost of conservation is equal to the difference between the market's valuation of additional oil consumption, \( P_d \), and the world price of oil, \( P_w \), plus the amount by which a marginal increase in U.S. oil conservation alters the cost of U.S. oil imports, \( (\partial P_w/\partial Q_C) \cdot Q_w \). If U.S. oil conservation has no effect on world oil prices, then the marginal cost of conservation is simply the difference between the U.S. market's marginal valuation of oil consumption and the world price of oil.

In theory, U.S. conservation can have a negative or positive effect on the world oil price and the U.S. oil import bill. Because the United States is a large oil-consuming nation, its conservation puts downward pressure on the world oil price. Some conservation measures make U.S. oil demand more inelastic, however, which gives a well-functioning OPEC cartel incentive to raise prices. Because most conservation measures only moderately affect the elasticity of oil demand, and Griffin (1985) and Dahl and Yücel (1991) show OPEC to be less than a perfect cartel, U.S. conservation efforts generally can be expected to reduce world oil prices and the U.S. oil import bill.

B. The Cost of Unilateral Conservation

In theory, U.S. oil conservation can lead to changes in oil consumption in the rest of the world that range from enhancing to completely offsetting
U.S. conservation policy. In practice, U.S. conservation actions are likely to be partially offset by increased oil consumption in the rest of the world. As U.S. oil conservation reduces the world oil price, it induces an increase in oil consumption outside the United States. The net effect is that the change in world oil conservation is somewhat less than the change in U.S. oil conservation.

If analysts are concerned with the net effects of a unilateral oil conservation policy, equation 1 provides an inadequate measure of the cost. When U.S. oil conservation stimulates oil consumption outside the United States, the marginal cost of net world conservation will be somewhat higher than the marginal cost of gross U.S. conservation.

Following Felder and Rutherford (1993), equation 1 can be augmented to express the marginal cost of net world oil conservation. Specifically, dividing the marginal cost of U.S. conservation by the change in net world oil conservation with respect to a change in U.S. oil conservation yields:

\[
MC_{cw} = \left( P_d - P_w + \frac{\partial P_w}{\partial Q_c} Q_w \right) \left( 1 - \frac{\partial Q_{dx}}{\partial P_w} \cdot \frac{\partial P_w}{\partial Q_c} \right)^{-1}
\]  

(2)

In the above equation, \( MC_{cw} \) denotes the marginal cost net world oil conservation achieved through U.S. efforts and \( Q_{dx} \) the quantity of non-U.S. oil consumption.

As equation 2 shows, the effects that U.S. oil conservation has on the cost of U.S. oil imports and on foreign oil consumption are related through the world oil price. As U.S. conservation lowers the world oil price, it reduces the cost of U.S. oil imports and brings about an increase in oil consumption outside the United States. If U.S. conservation has no effect on
the world oil price, however, both the cost of U.S. oil imports and foreign oil consumption will remain unchanged.

C. Cooperative Conservation

The gap between gross and net oil conservation can be lessened if the United States cooperates with other nations in reducing its oil consumption. In comparison to unilateral U.S. oil conservation, we estimate that cooperation among OECD nations can reduce offsetting gains in non-participant oil consumption by more than 50 percent. Extending cooperation beyond the OECD further reduces the offsetting gains in non-participant oil consumption.

Cooperative behavior could result from recognition that one country's action to reduce oil consumption confers global benefits in the form of reduced emissions. Several studies, such as Black, Levi and de Meza (1993), Bohm (1993), and Brown and Huntington (1994), examine the possibility of cooperative behavior between nations in reducing world oil consumption. These studies identify free-riding and uneven costs of participation as the most important obstacles to cooperation. The possibility of cooperation depends on a number of factors that are beyond what is presented here.

III. EMF STUDY PROVIDES PARAMETERS FOR ANALYSIS

Five models of the world oil market used in the eleventh Energy Modeling Forum (EMF) study provide the parameters for our analysis of the costs of oil conservation. From each model we obtained a set of projected world oil prices and quantities, as well as inferred elasticities of supply and demand for use in our analysis. These elasticities do not necessarily represent each model's structure but are indicative of the range of possible underlying market conditions.
A. The Models

The eleventh EMF study, *International Oil Supplies and Demands*, focused on the supply and demand trends over the 1988-2010 period for various scenarios and their implication for the world’s dependence upon Persian Gulf oil. For the EMF study, proprietors of 11 economic models of the world oil market simulated 12 different scenarios with standardized assumptions about exogenous or endogenous oil price trajectories, economic growth, energy-saving technical progress, and OPEC behavior. An EMF working group comprised of leading analysts and decision-makers from business, government, and academia analyzed and compared the results.

The analysis here is restricted to the five models shown in Table 1 because each reported results for the baseline conditions described below, and we could reliably estimate each model’s parameters. A comparison of all 11 models suggests that the five models we use represent well the range of models that participated in the EMF study.

Kress, et. al. (1992) describe each model’s structure and key variables. Key input variables for determining oil consumption in the models include: the crude oil price and GDP (all models) and a time trend for autonomous improvements in oil efficiency which is unrelated to price (OMS and DFI only). The demand functions for HOMS and FRB-Dallas are econometrically determined; those for OMS, DFI, and CERI are based upon judgmental parameters, which for some models are based partly upon available energy demand studies.

B. Baseline Projections

For each of the five models, we obtained a baseline projection of prices and quantities in the year 2010 from a cartel scenario for which each modeler reported results. In the cartel scenario, OPEC was assumed to operate as a
cartel and world economic growth was assumed to be 2.9% per year. Each model
determined the market-clearing world oil price and quantities endogenously
through the interaction of regional demands, supplies, and OPEC price-setting
behavior. For this scenario, all of the models forecast increasing U.S. and
world oil consumption, but with decreasing oil-to-GDP ratios. The analysis
presented here reflects improvements in the U.S. oil-to-GDP ratio beyond the
baseline projections.

C. Demand and Supply Elasticities

The analysis here utilizes the price elasticities of regional supply and
demand reported in Table 2. These key elasticities are inferred from two
model runs in which world oil prices were specified exogenously. In one
scenario, the world oil price is assumed to remain flat at $18 per barrel.
(All reported prices are in 1988 dollars.) In the other scenario, the world
oil price rises steadily from $18 per barrel until it reaches a plateau of $36
per barrel in 2000, at which the price is maintained through 2010. Both cases
assume that the market economies grow by 2.9 percent per annum and the U.S.
economy grows by 2.6 percent per annum. Because GDP is the same in both
cases, the resulting responses represent pure price elasticities.

There are limitations to inferring a model's price elasticities from two
scenarios (Huntington, 1992). Nevertheless, a more thorough analysis of how
the EMF models represent OECD demand (Huntington, 1993) indicates that the
price elasticities inferred from the flat and rising price scenarios are
generally consistent with econometric response surfaces estimated from the
results of all 12 scenarios, as well as those reported by the modelers
themselves.
D. OPEC Supply

Four of the models (OMS, CERI, HOMS and FRB-Dallas) represent OPEC price setting with price-reaction functions. The fifth model, DFI, represents OPEC price setting with dynamic optimization. Although the 12 EMF scenarios contained two OPEC cartel cases—the base case used here and a high demand case—a comparison of these two scenarios did not reveal how the models would behave when U.S. policy is used to reduce oil demand.

Our analysis here is based on three cases of OPEC supply for each model. Two cases rely on limiting assumptions. In one case, OPEC acts to hold price constant—that is, OPEC supply is perfectly elastic. In the other case, OPEC holds its production constant—that is, OPEC supply is perfectly inelastic. A third case relies on an intermediate assumption that OPEC supply is unitary elastic. Although uniform assumptions about OPEC supply reduce the potential variation in cost estimates across models, the remaining variation is instructive.

IV. THE COST OF CONSERVATION

The EMF study did not provide cost estimates for U.S. conservation. Rather, we use the parameters described above in a series of simulations to provide multiple estimates of the effect of U.S. oil conservation on prices and quantities on the world oil market. We then use equations 1 and 2 to estimate supply (marginal cost) curves of gross U.S. oil conservation and net world oil conservation. Our results are organized by assumed OPEC behavior.

A. If the World Oil Price Doesn’t Change

If OPEC adjusts its production to keep the world price of oil unchanged in the face of U.S. conservation efforts, the marginal cost of U.S. conservation equals the tax required to achieve that level of conservation.
In this case, there is no difference between U.S. and world conservation nor between the marginal cost of gross U.S. conservation and the marginal cost of net world conservation.

As Figure 1 shows, the marginal cost estimated for each model rises with conservation because higher taxes are required to achieve greater levels of conservation. Marginal costs rise more steeply for models in which U.S. oil consumption shows a smaller response to price (\(\partial Q_o / \partial P_o\) is less negative). Results from all of the models indicate that the first million barrels per day of oil conservation can be had for a marginal cost of less than $10 per barrel. For the HOMS, OMS and DFI models, the marginal cost of conservation rises above $20 per barrel before oil conservation reaches two million barrels per day. At two million barrels per day, results for the CERI and FRB-Dallas models still show the marginal cost of conservation below $10 per barrel. For the CERI and FRB-Dallas models, the marginal cost of conservation rises above $20 per barrel after oil conservation reaches four million barrels per day. At four million barrels per day, results for the HOMS, OMS and DFI models all indicate a marginal cost of oil conservation over $50 per barrel.

As Figure 1 shows, setting quantity targets for U.S. oil conservation policy would yield widely varied marginal cost estimates across the models. A conservation policy that sets targets for U.S. oil consumption based on historical use also would yield widely varied estimates of marginal cost across the models. In this case, differences in the projected quantities of oil consumption, as well as the responsiveness of consumption to changes in price contribute to the differences in cost estimates across the models. For each model, Table 3 indicates how much oil conservation the United States would have to achieve to keep its oil consumption from growing over the 22-
year period from 1988 to 2010 and the marginal cost of doing so. Estimates range from lows of near $13 per barrel for the CERI and OMS models to highs near $30 with the HOMS and FRB-Dallas models. Although the FRB-Dallas and CERI models evidence a similar response of U.S. oil consumption to changes in price, results for the models provide differing cost estimates because the FRB-Dallas model projected much higher consumption for the year 2010 than the CERI model. Similarly, results for HOMS show a higher marginal cost than those for OMS because HOMS projected much higher consumption for the year 2010 than OMS. The results for OMS and CERI models provide similar marginal cost estimates because the lower projection for U.S. consumption with the OMS model offsets the fact that it shows U.S. oil consumption as less sensitive to price than the CERI model.

B. If OPEC Supply Elasticity is Unitary

If OPEC supply is assumed to be unitary elastic, the world price of oil falls with U.S. conservation and the cost curves of gross U.S. conservation are shifted down and made steeper. Results for all of the models also show that a lower world oil price stimulates non-U.S. oil consumption, which leads to a difference between gross U.S. conservation and net world conservation. This effect is taken into account by estimating the cost of net world oil conservation. With a unitary OPEC supply elasticity, the marginal cost of conservation is negative at zero conservation for each model because increasing conservation from this point lowers the price paid for oil imports. The marginal cost curve is also steeper for each model. Two factors account for the steeper supply curve. The tax on U.S. oil consumption must rise more sharply with conservation to offset a falling world oil price. In addition,
the value of reducing the price of oil imports falls as conservation reduces U.S. oil imports. As Figure 2 shows, the results for the models provide varying estimates of the supply curve of gross U.S. conservation for the year 2010, even with the common assumption that OPEC has a unitary supply elasticity.

The estimated gains in non-U.S. oil consumption vary across the models. At one extreme, the results for the DFI model show that 20 percent of each barrel of U.S. oil conservation is offset by gains in non-U.S. oil consumption. At the other extreme, results for the CERI and FRB-Dallas models show that 30 percent of each barrel of U.S. oil conservation is offset by a gains in non-U.S. oil consumption. Results for the OMS and HOMS models show that 25 percent of each barrel of U.S. conservation is offset by gains in non-U.S. oil consumption.

With U.S. conservation stimulating non-U.S. oil consumption, the net gain in world oil conservation is less than gross U.S. conservation. As a consequence, the marginal cost of net world conservation estimated for each model rises more sharply than for gross U.S. conservation. As Figure 3 shows, results for the models again provide varying estimates of the supply curve of net world oil conservation.

C. If OPEC Production Doesn't Change

As the assumed elasticity of OPEC supply is lowered, U.S. conservation has a greater affect on world oil prices and non-U.S. oil consumption. As a result, the supply curves of gross and net conservation shift down and become steeper. In addition, the gap between gross U.S. conservation and net world conservation increases. Nevertheless, results for the models continue to provide widely varying estimates of the marginal cost of oil conservation.
At the limit, when OPEC supply is assumed to be perfectly inelastic, the estimated gains in non-U.S. consumption range from about 0.45 to 0.85 barrels for every barrel of oil that the United States conserves. These gains result in sharply higher cost estimates for net world oil conservation.

V. COST ESTIMATES RECONSIDERED

The analysis presented here assumes that oil conservation can only be obtained by getting consumers to adopt techniques that they would find more costly to use than oil. In addition, it assumes that the political process will select the least costly methods for achieving oil conservation. To the extent that these assumptions are not correct, our cost estimates may be too high or too low.

A. Engineering-Cost Studies

Some analysts, including the National Academy of Science Synthesis Panel on the Policy Implications of Greenhouse Warming (1991), have used engineering-cost studies to argue that supplies of conserved energy are available at a net savings of cost to consumers. In some cases, analysts have found that residential customers bypass energy-conserving investments offering as much as a 60 percent annual rate of return (Levine, et. al., 1994). To the extent that engineering-cost studies correctly represent the cost of energy conservation, the cost estimates presented here would be too high.

Market-oriented economists find this line of argument troublesome. In the absence of identifiable market imperfections, hidden costs or implicit life-style changes, the argument requires that individuals behave inefficiently by overlooking energy conservation options that would reduce costs. Among other factors, capital market imperfections, principal-agent problems and the lack of information have been identified as possible
imperfections in the energy market (Energy Modeling Forum, 1994). The existence of these imperfections is an empirical issue which remains unresolved.

B. The Political Process

Analysis of the political process through which oil conservation would be achieved might suggest our cost estimates represent lower bounds. To the extent that U.S. conservation policy alters free market decisions and prices, it creates opportunities for rent-seeking behavior. Among others, Tullock (1967, 1980) has argued that individuals who seek a rent have an incentive to expend real resources up to the value of the rent. In doing so, they dissipate the rent as costs.

The reduced cost of U.S. oil imports can be viewed as a rent created by U.S. oil conservation policy. Accordingly, rent-seeking behavior could generate costs as high as the benefit obtained by reducing the cost of oil imports. In our exercise, the marginal cost of U.S. conservation would rise up to the amount by which a marginal increase in U.S. conservation reduces import costs.

VI. CONCLUSIONS

The preceding analysis allows us to reach three conclusions. First, the first one million barrels of gross U.S. oil conservation can be obtained at a marginal cost below $10 (1988 dollars) per barrel. Results for some of the models show sharply rising costs after that point. Second, uncertainty about future oil market conditions suggests flexible policies are preferable to setting quantity targets for conservation or basing conservation on historical oil consumption levels. Finally, the costs of a given level of net world oil conservation achieved through unilateral U.S. conservation are likely to be
higher than the costs of the same level of gross U.S. conservation.

The model results show considerable variation in the estimated costs of oil conservation. The cost of quantity-based targets, such as holding U.S. oil consumption at 1988 levels, can range from inexpensive to quite costly. In those cases where quantity-based targets prove inexpensive, the policy does not represent much of a departure from conditions that would prevail in an unregulated market. If the variation in results across models can be taken to represent uncertainty about future oil market conditions, our findings suggest that flexible policies that can adjust to market conditions, such as consumption taxes, would better serve economic efficiency than setting specific conservation targets.

A U.S. policy of unilateral oil conservation is likely to reduce the world oil price and trigger offsetting gains in world oil consumption. The extent of these gains will depend on the response of non-U.S. oil consumption, OPEC supply and non-OPEC supply to changes in price, as well as the extent of U.S. conservation. Incorporating these effects generally means that the cost of a given quantity of net world conservation is greater than the cost of achieving the same quantity of gross U.S. conservation. The cost of net world conservation may be the most appropriate measure for policy analysis when externalities are more closely associated with global oil consumption than domestic oil consumption.
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Seeking Society, J. M. Buchanan, R. D. Tollison and G. Tullock, eds.
NOTES

*Research Department, Federal Reserve Bank of Dallas and Energy Modeling Forum, Stanford University, respectively. The authors wish to thank Susan August Brown, David Gould, Tony Reinsch, Mark Rodekohr, Lori Taylor, John Weyant, Mine Yücel, Ben Zycher and an anonymous referee for helpful comments and suggestions, as well as the modelers participating in the eleventh EMF study, International Oil Supplies and Demands. Any errors or omissions are solely the authors’. This article is a revised version of a paper presented at the Western Economic Association International 68th Annual Conference, Lake Tahoe, Nevada, June 20-24, 1993, in a session organized by Donald A. Norman, American Petroleum Institute. The views expressed in this article are those of the authors and should not be attributed to the Federal Reserve Bank of Dallas, the Federal Reserve System, the Energy Modeling Forum, or Stanford University.

1. An alternative to the approach taken here is to make appropriate adjustments when measuring the benefits.

2. The assumption excludes from the analysis the possibility of U.S. oil conservation being directed against specific uses, which would lower oil prices and act as a stimulus to domestic oil consumption in unregulated uses.

3. Derivation of the formulas used in the welfare analysis is provided in a mathematical appendix available by writing to the first-listed author, Research Department, Federal Reserve Bank of Dallas, P.O. Box 655906, Dallas, Texas 75265-5906.

4. Hoel (1991) examines a case in which one country’s unilateral actions to reduce emissions could lead to an increase in global emissions. This outcome depends on the country’s unilateral action weakening its bargaining position
in a global negotiation on emissions. The assumption made in the present analysis that U.S. conservation affects foreign oil consumption only through world oil prices precludes such an outcome.
Table 1
Models in EMF Study

<table>
<thead>
<tr>
<th>Model</th>
<th>Working Group Contact*</th>
</tr>
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<tbody>
<tr>
<td>EIA:OMS</td>
<td>Mark Rodekohr, Energy Information Administration</td>
</tr>
<tr>
<td>CERI</td>
<td>Anthony Reinsch, Canadian Energy Research Institute</td>
</tr>
<tr>
<td>HOMS</td>
<td>William Hogan, Harvard and Paul Leiby, Oak Ridge National Laboratory</td>
</tr>
<tr>
<td>FRB-Dallas</td>
<td>Stephen P. A. Brown, Federal Reserve Bank of Dallas</td>
</tr>
<tr>
<td>DFI-CEC</td>
<td>Dale Nesbitt, Decision Focus, Inc.</td>
</tr>
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*Organization listed for identification purposes. Models and results do not necessarily represent official views of listed organization.
Table 2
Inferred Price Elasticities of Regional Supplies and Demands, 2010

<table>
<thead>
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<th></th>
<th>Demand:</th>
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<th>Supply:</th>
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<td>Other</td>
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<td></td>
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<td>OECD</td>
<td>NonOECD</td>
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<tr>
<td>OMS</td>
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<td>-0.149</td>
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<td>-0.455</td>
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<td>-0.280</td>
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<td>-0.528</td>
<td>-0.400</td>
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<td>Other</td>
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<td>0.499</td>
<td>0.981</td>
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</tr>
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</table>

Note: Price elasticities have been inferred by comparing quantities supplied and demanded in the EMF rising and flat price cases.
Table 3

<table>
<thead>
<tr>
<th>U.S. Oil Consumption (millions of bbl per day)</th>
<th>1988</th>
<th>2010</th>
<th>Change</th>
<th>World Price</th>
<th>U.S. Demand Elasticity</th>
<th>Implied U.S. Tax</th>
</tr>
</thead>
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<td>OMS</td>
<td>17.6</td>
<td>18.9</td>
<td>1.3</td>
<td>53.90</td>
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<td>CERI</td>
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<td>20.5</td>
<td>3.0</td>
<td>29.62</td>
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<td>12.78</td>
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<td>HOMS</td>
<td>17.5</td>
<td>19.9</td>
<td>2.4</td>
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<td>27.38</td>
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<td>FRB-D</td>
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<td>23.5</td>
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<td>44.38</td>
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<td>DFI</td>
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<td>19.7</td>
<td>2.2</td>
<td>25.99</td>
<td>-0.185</td>
<td>23.90</td>
</tr>
</tbody>
</table>

Note: Price and Implied Tax are in 1988$ per barrel.
Figure 1
Estimated Supply of U.S. Oil Conservation
(World Oil Price Unchanged)
Figure 2
Estimated Supply of Gross U.S. Oil Conservation
(OPEC supply elasticity is unitary)

Dollars per barrel

U.S. Oil Conservation (million bbl/day)
Figure 3
Estimated Supply of Net World Oil Conservation
(OPEC supply elasticity is unitary)