

**Volume 14, Issue 4**

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*Pages 1-19*

**Pipeline Access and Market Integration in the Natural Gas Industry: Evidence from Cointegration Tests**

by Arthur De Vany (University of California, Irvine) and W. David Walls (University of Hong Kong)

**Abstract**

This research seeks to determine the extent to which the Federal Energy Regulatory Commission's policy of "open access" to natural gas pipelines has created competition in natural gas markets. We argue that recently developed cointegration techniques are the natural way to evaluate competition between natural gas spot markets at dispersed points in the national transmission network. We test daily spot prices between 190 market-pairs located in 20 producing fields and pipeline interconnections and find that the price series are not stationary and that most field markets were not cointegrated during 1987. By 1991, more than 65% of the markets had become cointegrated. The increased cointegration of prices is evidence that open access has made gas markets more competitive.

*Pages 21-36*

**Energy Consumption and Economic Activity in China**

by Chuanlong Tang (East West Center) and Sumner J. La Croix (University of Hawaii at Manoa)

**Abstract**

This paper uses province-level cross-section data to explore the relationship between energy consumption and economic activity in China. Our key finding is that the income elasticity of energy consumption is approximately 1.0. When a province exports energy or has significant amounts of heavy industry, its energy consumption is higher. However, income elasticities are similar across energy-exporting and -importing provinces. Energy consumption is lower in coastal provinces than inland provinces. We conclude that China's economy is unlikely to become significantly more energy-intensive during the 1990s.

*Pages 37-56*

## **Price, Environmental Regulation, and Fuel Demand: Econometric Estimates for Japanese Manufacturing Industries**

by Isamu Matsukawa (Central Research Institute of Electric Power, Japan), Yoshifumi Fujii (Bunkyo University, Japan) and Seishi Madono (Senshu University, Japan)

### **Abstract**

In this paper, we analyze interfuel substitution according to Japanese manufacturing sectors. We examine the impact of environmental regulations and technical changes on fuel choice, and the effects of price on fuel substitution, using pooled data on fuel consumption and purchase price for 58 regions in the period 1980-88. The empirical results, based on the estimation of translog unit fuel cost functions by sector, indicate that (1) substitution possibilities were found for most combinations of fuel types in every sector; and (2) environmental regulations and technical changes significantly impact fuel consumption for most sectors, but their effects on fuel demand differ both across sectors and fuel types.

*Pages 57-74*

## **Deregulation and Common Carriage in the Nordic Power System**

by Kjetil Bjorvatn and Sigve Tjøtta (SNF Foundation for Research in Economics and Business Administration, Norway)

### **Abstract**

In this paper, we analyze deregulation and integration of the Nordic markets for electric power. Nordic trade in electricity is controlled by national monopolies and is confined to occasional power. No transit is allowed. Due to its central location, Sweden plays a crucial role in the Nordic electricity market. For Sweden, common carriage without some form of compensation is not likely to be an acceptable form of integration. The Shapley values reveal that compensatory demands are likely to be quite large -- a fact which might complicate negotiations on the introduction of common carriage. An alternative to common carriage would be for Sweden to exert market power through monopolistic pricing of its transmission services. Government involvement may be necessary to secure a successful integration of international electricity markets.

*Pages 75-97*

## **Global Warming and Urban Smog: Cost-Effectiveness of CAFE Standards and Alternative Fuels**

by Alan J. Krupnick, Margaret A. Walls and Carol T. Collins (Resources for the Future, Washington DC, USA)

### **Abstract**

In this paper we estimate the cost-effectiveness, in terms of reducing greenhouse gas emissions, of increasing the corporate average fuel economy (CAFE) standard to 38 miles per gallon and substituting methanol, compressed natural gas (CNG), and reformulated gasoline for conventional gasoline. Greenhouse gas emissions are assessed over the entire fuel cycle and include carbon dioxide, methane, carbon monoxide, and nitrous oxide emissions. To account for joint environmental benefits, the cost per ton of greenhouse gas reduced is adjusted for reductions in volatile organic compound (VOC) emissions, and ozone precursor. CNG is found to be the most cost-effective of the alternatives, followed by increasing the CAFE standard, substituting methanol for gasoline, and substituting reformulated for conventional gasoline. Including the VOC benefits does not change the ranking of the alternatives, but does make the alternative fuels look better relative to increasing the CAFE standard. None of these alternatives look cost-effective should a carbon tax of \$35 per ton be passed, and only CNG under optimistic assumptions looks cost-effective with a tax of \$100 per ton of carbon.

*Pages 99-110*

### **Another Look at U.S. Passenger Vehicle Use and the 'Rebound' Effect from Improved Fuel Efficiency**

by Clifton T. Jones (Murray State University, Kentucky, USA)

### **Abstract**

Recently, Greene (1992) analyzed vehicle miles travelled for U.S. passenger vehicles over 1966-89 to econometrically estimate the "rebound" effect in fuel consumption resulting from improved fuel efficiency. He found that a static AR(1) model could not be rejected, implying that the rebound effect is small (13%) with no significant long-run adjustments, regardless of the assumed functional form (linear or loglinear). Another look at the data from a different model selection shows that while a loglinear AR(1) model is acceptable, the linear version is not. Using either form, a lagged dependent variable model cannot be rejected on statistical grounds yet has insignificant GNP effects, yielding similarly small short-run rebound effects, but significant long-run rebound effects of about 30%. Thus, the evidence from these competing models for a significant long-run adjustment process is mixed, so that its presence cannot be completely ruled out.

*Pages 111-121*

## **Short Run Income Elasticity of Demand for Residential Electricity Using Consumer Expenditure Survey Data**

by E. Raphael Branch (U.S. Department of Labor, Washington DC USA)

### **Abstract**

This study provides information on the relationship between income and electricity consumption based on the Consumer Expenditure Interview Survey (CE) of the Bureau of Labor Statistics, U.S. Department of Labor. The income elasticity of short run demand for residential electricity is estimated using household panel data for homeowners. The CE is rich in its coverage of household characteristic data, housing characteristic data, and appliance inventory data. This makes it possible to model electricity demand across areas in the United States more comprehensively than has been done in a number of earlier studies. The results, obtained using a generalized least squares estimator (GLS), include an income elasticity of demand for electricity of 0.23 and a price elasticity of -0.20. The GLS estimator is used because OLS estimates are inefficient due to the correlation of the errors which arises from the use of panel data.

*Pages 123-128*

## **Appliance Standards and the Welfare of Poor Families**

by Steven Stoff (University of California Energy Institute, Berkeley CA, USA)

### **Abstract**

Sutherland recently described U.S. federal appliance standards as causing a welfare loss that falls "particularly heavily on poor families." He attributed this loss to their risk aversion and to their being forced to invest at a discount rate of 7%. This note estimates the loss caused by this risk aversion at less than eight cents per year in the case of the 1993 refrigerator standard, and documents that standards have not been designed with the intention of forcing consumers to invest at a 7% discount rate.

*Pages 129-150*

## **Are There Useful Lessons from the 1990-91 Oil Price Shock?**

by John A. Tatom (Federal Reserve Bank of St. Louis, MS, USA)

### **Abstract**

Following Iraq's invasion of Kuwait, oil prices temporarily doubled. This paper examines the hypothesis that the U.S. economy had changed following previous oil price shocks, so

that the 1990 oil price rise (and its subsequent decline) had smaller effects than previously. It also examines a related hypothesis that such a transitory oil price hike would have little or no macroeconomic effect. It surveys and rejects arguments for a reduced impact of oil price shocks and for hysteresis. The article argues that the recent experience was comparable in magnitude to earlier shocks and that there were comparable macroeconomic developments and changes in the composition of output. The paper concludes with a test of the effect of energy prices on the misery index and shows that recent changes in misery are consistent with previous experience.

*Pages 151-161*

### **Oil Prices and Economic Activity: Is the Relationship Symmetric?**

by Javier F. Mory (Wilmington, North Carolina, USA)

#### **Abstract**

This paper presents some evidence of an asymmetric effect of oil price spikes upon the U.S. economy. It appears that price increases may be associated with reductions in economic activities, while price decreases do not display a distinct relationship with the economy. Possible explanations for these results are offered.

*Pages 163-182*

### **The Imperfect Price-Reversibility of World Oil Demand**

by Dermot Gately (Economics Department, New York University)

#### **Abstract**

This paper examines the price-reversibility of world oil demand, using price-decomposition methods employed previously on other energy demand data. We conclude that the reductions in world oil demand following the oil price increases of the 1970s will not be completely reversed by the price cuts of the 1980s. The response to price cuts in the 1980s is perhaps only one-fifth that for price increases in the 1970s. This has dramatic implications for projections of oil demand, especially under low-price assumptions. We also consider the effect on demand of a price recovery (sub-maximum increase) in the 1990s -- due either to OPEC or to a carbon tax -- specifically whether the effects would be as large as for the price increases of the 1970s or only as large as the smaller demand reversals of the 1980s. On this the results are uncertain, but a tentative conclusion is that the response to a price recovery would lie midway between the small response to price cuts and the larger response to increases in the maximum historical price. Finally, we demonstrate two implications of wrongly assuming that demand is perfectly price-reversible. First, such an assumption will grossly overestimate

the demand response to price declines of the 1980s. Secondly, and somewhat surprisingly, it causes an underestimate of the effect of income growth on future demand.

*Pages 183-205*

### **Irreversible Price-Induced Efficiency Improvements: Theory and Empirical Application to Road Transportation**

by I.O. Walker (OPEC Secretariat, Vienna, Austria) and Franz Wirl (Technical University of Vienna, Austria)

#### **Abstract**

Energy demand since 1986 seems inconsistent with the notion of constant income and price elasticities reported in the literature. Energy demand growth remained sluggish despite the simultaneous substantial reduction in real fuel costs and increases in real income. This investigation differentiates, as it were, two different price effects that should explain this apparent asymmetry in energy demand. The first effect is embedded in the technical efficiency and therefore largely irreversible. The second effect revolves around consumers' decisions and hence is reversible. This dichotomy of the price effect provides a suitable framework to study energy demand (in this instance, road transport). Moreover, the projections and policy recommendations following from this framework differ from the standard asymmetric specification. Moderate price increases will affect consumers' behavior, while only sufficiently high gasoline prices will trigger further efficiency improvements. The present low growth rates of energy demand mask a much higher growth at the service level, therefore energy demand growth may accelerate as these efficiency gains die out (if price levels or price expectations remain low).