The Impact of Sales-Below-Cost Laws on the U.S. Retail Gasoline Market

by

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Executive Summary

Numerous states have general sales-below-cost (SBC) laws, while others have SBC laws that are directed specifically at the retail gasoline market. Potential violations of state SBC laws occur when prices are less than the seller's cost of doing business, or some proxy thereof. The most commonly stated purpose of these laws is to protect small independent firms from predation by larger firms. Previous studies, however, indicate that SBC laws have resulted in higher prices to consumers. This study examines whether these laws have significantly altered the number and structure of retail gasoline outlets in the states that have adopted these laws. In particular, the report examines whether SBC laws, as well as other laws directed explicitly at the retail gasoline market, have protected smaller establishments from the general decline in number experienced nationwide.

The data on retail outlets utilized for this report are from the U.S. Bureau of the Census for the years 1987 and 1992, the latest years available. Census definitions allow for the identification of different types of outlets, with one of the categories representing the smaller establishments, those without payroll. The empirical results, taken collectively, indicate that neither general nor motor-fuel SBC laws have had a large and significant impact on the number or composition of retail gasoline outlets in the states with these laws in effect. The results also reveal that prohibitions on refinery-operated outlets (divorcement) and bans on self-service have not stemmed the decline in retail outlets nor affected the composition of retail establishments.

I. Introduction.

Unlike "fair trade" laws, state sales-below-cost (SBC) laws do not explicitly establish minimum prices. Instead, potential violations of SBC laws occur when prices are less than the seller's cost of doing business, or some proxy thereof.[1] The claimed motivation for these laws and SBC laws that apply specifically to motor fuel is the premise that vertically integrated firms and high volume retail marketers pose a predatory threat to small independent retailers. While SBC laws were implemented mainly to protect small firms from larger, often vertically integrated competitors, studies indicate that these laws have resulted in higher prices to consumers.[2] Despite higher prices, it is questionable how much protection these laws have afforded smaller independents. Although there are only a limited number of studies, the empirical evidence indicates that general SBC laws, as well as motor-fuel SBC laws, have done little to retard the decline of small retail establishments.[3] Over the last thirty years the marketing of gasoline has changed substantially. There are now considerably fewer outlets, and the ones that remain seldom resemble the traditional small service station with its single island of gasoline pumps and one or two service bays. If these studies are an accurate guide, SBC laws and other constraints on gasoline retailers have increased prices to consumers and done little to negate the trend towards larger establishments.

It wouldn't, of course, be the first time that regulations have proven relatively ineffective at stopping structural change, even where that appears to have been the intent of the law. In the late 1920s and the 1930s, for example, numerous states passed bills that imposed special taxes on chain stores. Nevertheless, chain stores continued to capture an ever-increasing share of the market, especially in retail grocery sales. These special taxes were not, however, without

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[1] For a discussion of the legal history and scope of state statutory provisions prohibiting sales below cost, see Francis M. Dougherty (1985), "Validity, Construction, and Application of State Statutory Provisions Prohibiting Sales of Commodities Below Costs—Modern Cases," *ALR4th*, pp. 612–652.

[2] Robert N. Fenil and William C. Lane (1985), "Thou Shalt Not Cut Prices! Sales-Below-Cost Laws for Gas Stations," *Regulation* 9, pp. 31-35; and Rod W. Anderson and Ronald N. Johnson (forthcoming), "Antitrust and Sales-Below-Cost Laws: The Case of Retail Gasoline," *Review of Industrial Organization*. Anderson and Johnson find a negative impact on consumers only for motor-fuel SBC laws.

[3] Michael J. Houston (1981), "Minimum Markup Laws: An Empirical Assessment," *Journal of Retailing* 57, pp. 98–113, concluded that SBC laws had little affect on the viability and survivorship of small retail firms. Of more relevance is the paper by Rayola Dougher and Thomas F. Hogarty (1991), "The Impact of State Legislation on the Number of Retail Gasoline Outlets," American Petroleum Institute, Research Study #062. The authors examine cross-sectional state data on changes in the number of retail gasoline outlets between 1977 and 1987. They fail to find a statistically significant relationship between changes in the number of retail outlets and the presence of motor-fuel SBC laws, divorcement legislation, or a ban on self-service. The results offered in this report, using 1987 and 1992 data, support their findings.

consequence, as they significantly reduced the share of grocery store sales obtained by chain stores and likely increased prices to consumers.[4]

This report examines the impact of SBC laws on the U.S. retail gasoline market. In particular, the report examines the impact these laws have had on the number of retail establishments, the proportion of small operators in each state's market, and the proportion of outlets with service bays. The latter is a characteristic generally associated with traditional service stations. Because 1997 U.S. Census data were not available at the time this report was written, the analysis focuses on the years 1987 and 1992.

II. The Impact of SBC Laws.

The notion that vertically integrated firms and high volume retail marketers pose a predatory threat to small independent gasoline retailers is long-standing.[5] Proponents of SBC laws have often argued that these laws are necessary because the larger firms will engage in predatory pricing, a form of strategic behavior whereby a firm initially lowers its price below its own costs to drive rivals out of business and scare off potential entrants. When rivals disappear, the firm supposedly raises price and more than recoups its losses.

Although studies indicate that SBC laws have increased prices to consumers, it does not necessarily follow that profits of gasoline retailers will also increase. Entry into the retail gasoline business is relatively unencumbered compared to other industries and high profit margins would likely attract entry. Moreover, with the advent of convenience stores, price competition in the sale of gasoline might be replaced by other types of product competition. T[illegible] reduction in the margins of other products, like car washes, sold by retailers can drive profits downward. Because SBC laws may encourage firms to engage in other types of competition, these laws can have an ambiguous effect on the average size and number of establishments, and therefore, empirical analysis is called for.

The first step in empirically determining the impact of these laws is to identify those states having SBC laws. As shown in Table 1, about half the contiguous 48 states had general SBC laws and 7 states had motor-fuel SBC laws in effect in both 1987 and 1992. Montana enacted its motor-fuel SBC Law in 1991.[6] Because a one-year time frame is too short to allow

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[4] See Thomas W. Ross (1986), "Store Wars: The Chain Tax Movement," 29 *Journal of Law & Economics*, pp. 125-137.

[5] See, for example, Fred C. Allvine and James M. Patterson (1974), *Highway Robbery: An Analysis of the Gasoline Crisis*, Bloomington: Indiana University Press.

[6] Montana Retail Motor-fuel Marketing Act (*Montana Code, Annotated 30-14-802*). In response to complaints that the motor-fuel SBC law was contributing to high gasoline prices in the state, the Montana House of Representatives voted 56 to 43 on February 25, 1997, to repeal the law. This measure was tabled, however, by the Senate in early April and died in committee. A petition was then circulated and sufficient signatures obtained to place an initiative on the November, 1998, general

significant structural change to occur, the statistical analysis that follows treats Montana as not having had a motor-fuel SBC law in effect in 1992. The cross-sectional variability exhibited in Table 1, plus data on the number and characteristics of gasoline retail outlets, offer a test of the hypothesis that SBC laws provide a significant degree of protection to smaller establishments. A priori, however, it is likely that motor-fuel SBC laws will operate with more force than general SBC laws, and the tests employed distinguish between the two.[7] Although aimed at saving smaller establishments, both general and motor-fuel SBC laws are up against a changing market structure, one that since the early 1970s has been characterized by the rise of self-service and convenience store tie-ins.

Table 2 provides a picture of the dynamics of the retail gasoline market for the period 1972-1992. The source of data on the outlets of various types that sell gasoline is the U.S. Bureau of the Census. Census definitions allow for the identification of three types of gasoline outlets: service stations with payroll, service stations without payroll, and other outlets with payroll that sell gas. The first two types of outlets (Columns 1 and 2) generate more than 50 percent of their revenues from the sale of gasoline, while the third (Column 3) generates less than 50 percent of revenues from gasoline sales. Missing from the Census definitions are outlets without payroll that generate less than 50 percent of their revenues from the sale of gasoline. Reliable estimates of the number of these outlets do not exist, but it is likely that these establishments represent only a small fraction of the market.[8]

The data in Table 2 reveal two notable trends. First, the number of retail outlets has declined substantially over time. Second, establishments without payroll have been especially hard hit. As a percent of total outlets, establishments without payroll have dropped from 15.4 percent in 1972 to 9.2 percent in 1992. This category contains the smaller outlets, while the third category (column 3) contains the larger convenience stores with food tie-ins. Contributing to the decline in outlets have been environmental regulations which have become increasingly strident over time, especially standards on underground storage tanks. Congress explicitly addressed problems of leaking gasoline underground storage tanks in the Hazardous and Solid Waste Amendments passed in 1984. These were amendments to the Resources Conservation and Recovery Act of 1976. A December 1998 deadline for further upgrading of underground storage tanks will result in the closure of many remaining smaller outlets.

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election ballot. The initiative passed and the Montana Retail Motor-fuel Marketing Act of 1991 was repealed effective January 1, 1999.

[7] For the statistical analysis, states were classified as having either a general SBC law or a motor-fuel SBC law.

[8] One method of obtaining estimates of this segment of the market is described in Rayola Dougher (June 1992), "Derivation of the Number of Outlets," Research Monograph, American Petroleum Institute. This method, however, requires the assumption that the structure of the market for outlets without payroll is exactly the same as that for outlets with payroll. Dougher and Hogarthy, *supra note 3*, use that method in their analysis.

III. Empirical Results.

This section utilizes standard regression analysis to examine the impact of SBC laws on the number of retail establishments, the proportion of small operators in each state's market, and the proportion of outlets with service bays. Because factors influencing the market for gasoline vary across states, the estimating equations contain a number of controlling variables, including population density, per capita income, and population growth over the preceding five-year period. These data were collected from various issues of the *Statistical Abstract of the United States*. Population density was included because high-density areas are likely to have fewer and larger outlets.[9] Per capita income is used as a proxy for property values. Higher property values are expected to lead to fewer and larger stations. Because many of the older service stations were not configured for the convenience store trade, the adoption of these types of outlets would depend on how quickly they were replaced with new ones better suited to that trade. Since the construction of new outlets is more likely to occur in states experiencing relatively faster population growth, this variable is expected to play an important role in the analysis. In addition, Census Bureau payroll data for service stations was used to compute a per employee annual earnings series. Also included in the analysis are state dummy variables that identify states with bans on self-service or divorcement statutes (see notes to Table 1).

The four dependent variables that we seek to explain in the analysis that follows are the number of outlets per state, average outlet size in terms of fuel sales per outlet, percent of outlets without payroll, and percent of outlets with bays. Table 3 contains descriptive statistics.

The dependent variable in column (1) of Table 4 is the total number of outlets selling gasoline, while the dependent variable in column (2) is the state's total gasoline consumption divided by the total number of outlets, a measure of average outlet size. Both regressions include a year dummy to account for structural shifts not captured by the explanatory variables. The results in column (1) indicate that the variability in number of outlets across states is largely explained by fuel consumption. Indeed, that variable dominates and leaves little left to be explained by other included variables. The coefficient on the dummy variable identifying a state as having a general SBC law is negative, suggesting that the presence of that law actually reduces the number of outlets. However, the coefficient on that variable is barely significant at the 10 percent level. A more conventional criterion for statistical robustness is that coefficients be statistically significant at the 5 percent level.

Since the regression results in column (1) are dominated by the fuel consumption variable, more emphasis should be placed on the regression using average outlet size. The

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[9] Rural markets are more likely to be monopolistically competitive with each outlet occupying a small local niche. In contrast, high population density markets are more likely to exhibit intense competition and feature larger outlets. See the discussion in Andrea Shepard (1993), "Contractual Form, Retail Price, and Asset Characteristics in Gasoline Retailing," 24 *RAND Journal of Economics*, pp. 58-77; and Andrea Shepard (1991), "Price Discrimination and Retail Configuration," 99 *Journal of Political Economy*, pp. 30-53.

results reported in column (2) indicate that per capita income, a proxy for property value, and population growth have large and significant impacts on outlet size. Note that while the sign on the coefficient of the dummy variable identifying states with motor-fuel SBC laws is positive in column (1) and negative in column (2), consistent with the notion advanced by the law's proponents that it protects smaller operators, these results are not statistically significant at the 10 percent level, although they are close.

An additional test of the impact of SBC laws on the number of outlets is offered in columns (3) and (4). The dependent variable in those columns is the percent change in the number of outlets over the period 1987 and 1992. The hypothesis tested with this specification is that SBC laws have slowed the rate of decline of outlets. The results in column (4) suggest that the presence of a motor-fuel SBC law is associated with a slower rate of decline in outlets. However, the opposite effect holds for the presence of a ban on self-service, also considered a regulatory means for preserving establishments. These conflicting results, plus the lack of a statistically significant impact for the coefficients of the SBC variables in column (3), bring into question the robustness of the results for that variable.

Table 5 presents regression results on the percent of outlets without payroll, the smaller outlets, and the percent of outlets with bays. The results indicate that the decline in outlets without payroll is associated with population growth and increasing property values, and that the laws aimed at protecting these establishments appear to have had little impact. In particular, the coefficients of the two SBC-law variables are not statistically significant. Similarly, the coefficients of the two SBC-law variables in the regression on the percent of gasoline service stations with service bays are also not statistically significant, while population growth had a negative impact.

Viewed collectively, the results reported in Tables 4 and 5 fail to reveal significant and positive effects of SBC laws on the survivability of establishments in general and, in particular, the protection of smaller retail outlets. The demise of the smaller outlets appears to have been driven by a changing market structure and population growth.

While the belief that SBC laws protect smaller establishments is widespread, this report indicates there is little basis for that belief. Thus, the higher retail prices that have accompanied such laws have imposed costs on consumers with no offsetting benefit. Attempts to regulate an industry are often premised on the idea that regulation will improve matters for some constituency. But that outcome can be elusive, with the end result offering little to the favored constituency while imposing substantial costs on the general public.

Table 1: State Motor-fuel and Sales-Below-Cost Laws

State	1987		1992		Comments
	General Sales-Below-Cost Law	Motor-Fuel Sales-Below-Cost Law	General Sales-Below-Cost Law	Motor-Fuel Sales-Below-Cost Law	
Alabama	no	yes	no	yes	
Arizona	no	no	no	no	
Arkansas	yes	no	yes	no	MFSBC law enacted 3/8/93 but was immediately challenged and declared unconstitutional
California	yes	no	yes	no	
Colorado	yes	no	yes	no	MFSBC law enacted 7/1/93
Connecticut	no	no	no	no	
Delaware	no	no	no	no	
Florida	no	yes	no	yes	
Georgia	no	yes	no	no	MFSBC law was in effect from 1985 to 1987 only
Idaho	yes	no	yes	no	
Illinois	no	no	no	no	
Indiana	no	no	no	no	
Iowa	no	no	no	no	
Kansas	no	no	no	no	
Kentucky	yes	no	yes	no	

Louisiana	yes	no	yes	no	
Maine	yes	no	yes	no	
Maryland	yes	no	yes	no	
Massachusetts	yes	yes	yes	yes	
Michigan	no	no	no	no	
Minnesota	yes	no	yes	no	
Mississippi	no	no	no	no	
Missouri	no	no	no	no	MFSBC law enacted in 8/28/93
Montana	yes	no	yes	yes	MFSBC law enacted in 1991
Nebraska	no	no	no	no	
Nevada	no	no	no	no	
New Hampshire	no	no	no	no	
New Jersey	no	yes	no	yes	
New Mexico	no	no	no	no	
New York	no	no	no	no	
North Carolina	no	yes	no	yes	MFSBC law enacted in 1985
North Dakota	yes	no	yes	no	
Ohio	no	no	no	no	
Oklahoma	yes	no	yes	no	
Oregon	no	no	no	no	
Pennsylvania	yes	no	yes	no	
Rhode Island	yes	no	yes	no	
South Carolina	yes	no	yes	no	

South Dakota	no	no	no	no
Tennessee	yes	yes	yes	yes
Texas	no	no	no	no
Utah	yes	yes	yes	yes
Vermont	no	no	no	no
Virginia	yes	no	no	no
Washington	yes	no	yes	no
West Virginia	yes	no	yes	no
Wisconsin	yes	no	yes	no
Wyoming	yes	no	yes	no

Notes: In addition, both New Jersey and Oregon have laws banning self-service that were in effect in 1987 and are currently in place. Connecticut, Delaware, Maryland, Nevada, and Virginia have laws with a divorcement provision.

Source: Commerce Clearing House Trade Regulation Reports and individual state codes.

Table 2. The Decline in U.S. Retail Gasoline Outlets

Year	(1)* Number of Service Stations With Payroll and Gasoline Sales>50%	(2)* Number of Outlets Without Payroll and Gasoline Sales>50%	(3)** Number of Outlets With Payroll and Gasoline Sales<50%	(4) Total Number of Outlets Selling Gasoline Cols. (1), (2), & (3)
1972	183,385	43,074	52,577	279,036
1977	146,523	29,942	64,555	241,020
1982	116,188	19,326	39,802	175,316
1987	114,748	22,432	35,985	173,165
1992	105,334	14,248	35,825	155,407

Sources: (*) U.S. Department of Commerce, Bureau of the Census, *Census of Retail Trade, Geographic Area Series*, various issues. (**) U.S. Department of Commerce, Bureau of the Census, *Census of Retail Trade, Merchandise Line Sales*, various issues.

Table 3. Descriptive Statistics (1987 & 1992)

Variable	Mean	Std Dev	Minimum	Maximum
Number of Retail Outlets	3,401.8	2,887.9	407	14,984
Fuel Sales (in millions of gallons)	2,698.3	2,644.0	313.6	15,280.0
Fuel Sales Per Outlet (in 000s of gallons)	767.37	178.40	487.73	1519.6
Percent of Outlets Without Payroll	14.47	5.79	4.86	32.00
Percent of Outlets With Bays	38.84	11.81	15.12	6.10
Annual Earnings (in 000s of constant dollars)	11.250	1.102	8.950	14.580
Population Density (in 000s per sq. mile of land area)	168.46	234.85	4.80	1049.9
Income (in 000's of constant dollars)	18.339	3.020	12.345	27.150
Percent Population Growth (previous five years)	4.45	5.44	- 5.88	31.52

Sources: Source for gasoline consumption by state, Federal Highway Administration, *Highway Statistics*, "Highway Use of Gasoline by State, 1949-1995," MF-226. Income and population density figures are from *Statistical Abstract of the United States*, various issues. See Table 2 for other sources.

Table 4: Impact of State Legislation and the Number of Retail Gasoline Outlets

Explanatory Variable	Dependent Variable= Number of Outlets (1)	Dependent Variable= Outlet Size (2)	Dependent Variable= Percent Change in Number of Outlets (3)	Dependent Variable= Percent Change in Number of Outlets (4)
Year=92	- 346.51 (1.63)	78.24** (2.74)	--	--
Fuel Consumption	1.05** (25.86)	--	--	--
Wage Rate	12.83 (0.09)	- 19.29 (1.03)	--	--
Population Density	0.22 (0.32)	- 0.04 (0.47)	--	--
Per Capita Income	- 89.29 (1.51)	25.24** (3.37)	--	--
Population Growth	- 26.32 (1.26)	15.32** (5.61)	0.097 (0.80)	0.16 (1.32)
General Sales-Below-Cost Law	- 370.07* (1.76)	11.06 (0.39)	0.20 (0.12)	- 0.45 (0.32)
Motor-fuel Sales-Below-Cost Law	505.46 (1.58)	- 60.26* (1.40)	2.39 (1.07)	3.34* (1.68)
Ban on Self-Service	- 494.28 (0.94)	128.44* (1.83)	--	- 13.28** (4.03)
Divorcement Law	18.99 (0.05)	62.86 (1.24)	--	- 2.05 (0.84)
Constant	2409.00** (1.70)	413.60** (2.16)	- 10.82** (8.59)	- 10.20** (9.23)
R-squared	.91	.56	.04	.31
Number of Observations	96	96	48	48

Notes: (Absolute t-statistics in parentheses). * Significant at the 10 percent level, two tail test. ** Significant at the 5 percent level.

Table 5: Impact of State Legislation on the Characteristics of Retail Gasoline Outlets

Explanatory Variable	Dependent Variable= Percent of Outlets Without Payroll (1)	Dependent Variable= Percent of Outlets With Bays (2)
Year=92	- 2.21** (2.53)	- 11.42** (5.81)
Wage Rate	0.87 (1.53)	0.80 (0.62)
Population Density	- 0.0002 (0.06)	0.017** (2.72)
Per Capita Income	- 1.39** (6.06)	0.72 (1.39)
Population Growth	- 0.30** (3.63)	- 0.31* (1.69)
General Sales-Below-Cost Law	0.22 (0.25)	1.18 (0.60)
Motor-fuel Sales-Below-Cost Law	1.69 (1.28)	- 4.56 (1.55)
Ban on Self-Service	2.57 (1.20)	7.40 (1.55)
Divorcement Law	0.07 (0.04)	0.97 (0.28)
Constant	32.13** (5.49)	20.64 (1.58)
R-squared	.61	.54
Number of Observations	96	94

Notes: (Absolute t-statistics in parentheses). * Significant at the 10 percent level, two tail test. ** Significant at the 5 percent level.

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PUBLICATIONS:

Journal Publications:

- Anderson, Rod W. and Ronald N. Johnson. (Forthcoming). "Antitrust and Sales-Below-Cost Laws: The Case of Retail Gasoline." *The Review of Industrial Organization.*
- Johnson, Ronald N. (1998). "Multiple Products, Community forestry and Contract Design: The Case of Timber Harvesting and Resin Tapping in Honduras." *Journal of Forest Economics* 4(2): 127-46.
- Johnson, Ronald N. (1996). "Implications of Taxing Quota Value in an Individual Transferable Quota Fishery: Reply." *Marine Resource Economics* 11(2):129-30.
- Johnson, Ronald N. (1995). "Implications of Taxing Quota Value in an Individual Transferable Quota Fishery." *Marine Resource Economics* 10:327-340.
- Johnson, Ronald N. and Allen M. Parkman. (1995). "Vertical Mergers and Selective Price Cutting." *The Review of Industrial Organization* 10(5):533-540.
- Johnson, Ronald N. and Gary D. Libecap. (Fall 1995). "Courts, A Protected Bureaucracy, and Reinventing Government." *University of Arizona Law Review* 37(3):791-823.
- Johnson, Ronald N., Randal R. Rucker, and Holly Lippke. (1995). "Expanding U.S. Log Export Restrictions: Impacts on State Revenue and Policy Implications." *Journal of Environmental Economics and Management* 29:197-213.

- Johnson, Ronald N. and Gary Libecap. (January 1994). "Patronage to Merit and Control of the Federal Government Labor Force." *Explorations in Economic History* 31(1):91-119.
- Johnson, Ronald N. and Allen Parkman. (Spring 1991). "Premerger Notification and the Incentive to Merge and Litigate." *Journal of Law, Economics and Organization* 7(1): 145-162.
- Johnson, Ronald N. and Gary Libecap. (January 1991). "Public Sector Employee Voter Participation and Salaries." *Public Choice* 68(1): 137-150.
- Johnson, Ronald N. (September 1990). "Commercial Wild Species Rearing: Competing Groups and Regulation." *Journal of Environmental Economics and Management* 19(2): 127-142.
- Johnson, Ronald N. and Gary Libecap. (Spring 1989). "Bureaucratic Rules, Supervisor Behavior and the Effect on Salaries in the Federal Government." *Journal of Law Economics and Organization* 5(1): 53-82.
- Johnson, Ronald N. and Gary Libecap. (July 1989). "Agency Growth, Salaries and the Protected Bureaucrat." *Economic Inquiry* 27(3): 431-451.
- Johnson, Ronald N. and Myles J. Watts. (January 1989). "Contractual Stipulations, Resource Use and Interest Groups: Implications from Federal Grazing Contracts." *Journal of Environmental Economics and Management* 16(1): 87-96.
- Johnson, Ronald N. and Allen M. Parkman. (Winter 1987). "The Role of Ideas in Antitrust Policy Toward Vertical Mergers: Evidence from the F.T.C. Cement - Ready Mixed Concrete Cases." *The Antitrust Bulletin* 32(4): 841-883.
- Johnson, Ronald N. and Allen M. Parkman. (September 1987). "Spatial Competition and Vertical Integration; Cement and Concrete Revisited: Comment." *American Economic Review* 77(4): 750-753.
- Anderson, Terry and Ronald N. Johnson. (October 1986). "The Problem of Instream Flows." *Economic Inquiry* 24(4): 535-554.
- Benson, Bruce and Ronald N. Johnson. (July 1986). "The Lagged Impact of State and Local Taxes on Economic Activity." *Economic Inquiry* 24(3): 389-401.
- Johnson, Ronald N. (May 1985). "Restraint Under Open Access: Discussion." *American Journal of Agricultural Economics* 67(2): 373-376.
- Johnson, Ronald N. (April 1985). "Retail Price Controls in the Dairy Industry: A Political Coalition Argument." *Journal of Law and Economics* 28(1): 55-75.
- Johnson, Ronald N. and Allen Parkman. (August 1983). "Spatial Monopoly, Non-Zero Profits and Entry Deterrence: The Case of Cement." *The Review of Economics and Statistics* 65(3): 431-439.
- Johnson, Ronald N. (Winter 1983). "The Budget Maximization Hypothesis and USDA Forest Service." *Renewable Resources Journal* 1(3): 8-15.
- Johnson, Ronald N. and Gary D. Libecap. (December 1982). "Contracting Problems and Regulations: The Case of the Fishery." *American Economic Review* 72(5): 1005-1022.
- Johnson, Ronald N. (November 1981). "Economic Trade-Off and the North Carolina Shrimp Fishery: Comment." *American Journal of Agricultural Economics* 63(4): 746.
- Johnson, R.N., M. Gisser, and M. Werner. (October 1981). "The Definition of a Surface Water Right and Transferability." *Journal of Law and Economics* 24(2): 273-288.
- Johnson, R.N. and Gary Libecap. (1980). "Efficient Markets and Great Lakes Timber: A Conservative Issue Re-examined." *Explorations in Economic History* 17: 372-385.
- Johnson, R.N. and Gary Libecap. (October 1980). "Agency Costs and the Assignment of Property Rights: The Case of South-Western Indian Reservations." *Southern Economic Journal* 47(2): 332-347.
- Libecap, Gary and R.N. Johnson. (January 1980). "Legislating Commons: The Navajo Tribal Council and the Navajo Range." *Economic Inquiry* 18(1): 69-86.
- Gisser, Micha and R.N. Johnson. (December 1979). "A Note on Inflation and Concentration." *Journal of Political Economy* 87(6): 1377-1382.
- Johnson, R.N. (August 1979). "Auction Markets, Bid Preparation Costs and Entrance Fees." *Land Economics* 55(3): 313-318.
- Johnson, R.N. (April 1979). "Oral Auction Versus Sealed Bids: An Empirical Investigation." *Natural Resources Journal* 19(2): 315-335.

- Libecap, Gary and R.N. Johnson. (March 1979). "Property Rights, Nineteenth-Century Federal Timber Policy, and the Conservation Movement." *Journal of Economic History* 39(1): 129-142.

- Cummings, Ronald G. and R.N. Johnson. (November 1978). "Welfare Analysis of Long-Term Forest Price Stabilization: Note." *American Journal of Agricultural Economics* 60(4): 689-690.

Books:

- Johnson, Ronald N. and Gary Libecap. (1994). *The Federal Civil Service System and the Problem of Bureaucracy: The Economics and Politics of Institutional Change*, University of Chicago Press, NBER Series.

Chapters in Books:

- Johnson, Ronald N. (1997). "Ecosystem Management and Reinventing Government." In: *Breaking the Environmental Policy Gridlock.* Terry L. Anderson, ed. Stanford, CA: Hoover Institution Press.
- Johnson, Ronald N. and Gary D. Libecap. (1996). "Reinventing the Federal Civil Service." In: *Reinventing Government and the Problem of Bureaucracy.* Gary Libecap, Ed. London: JAI Press.
- Johnson, Ronald N. (1990). "Commentary on, The Prospects for Using Economic Incentives for Conservation of Biological Diversity," by Jon H. Goldstein, in *The Preservation and Valuation of Biological Resources*, Gordon Orians, et al., eds. Seattle, University of Washington Press.
- Benson, Bruce and R.N. Johnson. (1986). "Capital Formation and Interstate Tax Competition." In: *Taxation and Capital Formation.* Dwight R. Lee, ed. San Francisco, CA: Pacific Institute.
- Johnson, R.N. (1985). "U.S. Forest Service Policy and its Budget." In: *Forestlands: Public and Private.* Robert Deacon and Bruce Johnson, eds. Cambridge, MA: Ballinger.
- Gisser, Micha and R.N. Johnson. (1983). "Institutional Restrictions on the Transfer of Water Rights and the Survival of an Agency." In: *Water Rights.* Terry L. Anderson, ed. Cambridge, MA: Ballinger.
- Johnson, Ronald N. and John Baden. (1983). "A Positive Sum Timber Harvest Policy." In: *Agenda '83: A Mandate for Leadership Report.* Richard N. Holwill, ed. Washington, DC: Heritage Foundation.
- Libecap, Gary and R.N. Johnson. (1981). "The Navajo and Too Many Sheep: Overgrazing on the Reservation." In: *Bureaucracy vs. Environment.* John Baden and Richard L. Stroup, eds. Ann Arbor: University of Michigan Press.

BOOK REVIEWS:

- Poole, Keith T., and Howard Rosenthal. *Congress: A Political-Economic History of Roll Call Voting.* Reviewed for *The Journal of Economic History* (June, 1998).
- O'Leary, Wayne M. *Main Sea Fisheries: The Rise and Fall of a Native Industry, 1830-1890.* Reviewed for *The Journal of Economic History* (March, 1998).
- Novak, William J. *The People's Welfare: Law and Regulation in Nineteenth-Century America.* Reviewed for *The Journal of Economic History* (September, 1997).
- Mattey, Joe P. *The Timber Bubble That Burst: Government Policy and the Bailout of 1984.* Reviewed for *Journal of Regional Science* (February, 1992).
- Church, Albert M. *Taxation of Nonrenewable Resources.* Reviewed for *The Southwestern Review of Management and Economics* (Spring, 1983).
- Carlson, Leonard A. *Indians, Bureaucrats and Land: The Dawes Act and the Decline of Indian Farming.* Reviewed for *Annals of the American Academy of Political and Social Sciences* (May, 1982).
- Martin, Donald L. *On Ownership Theory of the Trade Union.* Reviewed for *Journal of Labor Research* (Summer, 1982).

REVIEW WORK DONE FOR:

- Journal of Environmental Economics and Management, Associate Editor (August 1994–January 1996)
- American Economic Review
- Review of Economics and Statistics
- Journal of Law and Economics
- Economic Inquiry
- Journal of Political Economy
- Journal of Economic History
- American Journal of Agricultural Economics
- Natural Resources Journal
- Land Economics
- Southern Economics Journal
- National Science Foundation
- Water Resources Research
- Forest Science
- Social Science Quarterly
- Scandinavian Journal of Economics
- Marine Resource Economics
- Midwestern Journal of Business and Economics
- Quarterly Journal of Business Economics
- Explorations in Economic History
- Contemporary Policy Issues
- Journal of Institutional and Theoretical Economics