

Texas BUSINESS

The Bureau of Business Research

Review

The University of Texas at Austin

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Transporting the Nation's Energy

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In long-range planning, management must be able to consider both economic and political events that will influence the company environment. Such a highly interdependent industry as transportation particularly needs good information on future possibilities. We have devised a model with three simulations designed to forecast future possibilities for the transportation of energy-related products, especially coal, under a variety of conditions.

We have tried to consider not only economic factors that will influence the expenditure of major capital funds, but also governmental actions that influence, perhaps indirectly, the course of transportation planning. For example, the Clean Air Act of 1970 dealt a devastating blow to eastern coal mining and increased the demand for western coal that is low in sulfur. Between 1965 and 1980, coal production in the West increased tenfold, while production increased by only 62 percent in the nation as a whole and 80 percent in the South.¹ This change in demand for coal had important ramifications for western railroads, which were suddenly faced with increased demand. Similar issues that will affect transportation planning in the future include the proposed coal slurry pipeline, user charges for inland waterways, and the adequacy of taxes paid by the trucking industry. Of course, the national goal of energy independence and the way in which it is achieved will profoundly affect the transportation industry.

Economic Activity and Transportation Demand

From 1955 to 1979, real gross national product (GNP) increased from \$655 billion to \$1,432 billion—a 119 per-

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cent increase—while industrial production increased by 161 percent. During this same period, the output of the freight transportation industry increased by 99 percent (see table 1). The relatively lackluster performance of freight transportation results principally from the changing mix of economic activity. As real per capita income has increased, consumers have increased their purchases of services at rates greater than those paid for goods. Hence, the output of transportable goods increased at a slower rate than did total economic activity. Moreover, the increase in aggregate transportation demand has not been distributed uniformly. From 1955 to 1979, the output expanded by 47 percent for Class 1 and 2 railroads,² 175 percent for motor carriers, and 189 percent for oil pipelines. The nation's river and canal operators more than tripled their output during this period. In comparison to regulated motor carriers, the rail industry has suffered a severe decline in market share (see table 2). The rail share of tonnage declined from 41 percent in 1955 to 26 percent in 1978—a 36 percent slide. The rail share slipped 28 percent in ton miles and 43 percent in freight revenue. By contrast, over the same period the regulated motor carriers increased their market share by 85 percent in tonnage, 41 percent in ton miles, and 71 percent in revenue.

The decline in rail market share has been spread across a broad spectrum of commodities (see table 3). Between 1964 and 1980, rail tonnage of food products declined by 3 percent while production in this industry increased by 68 percent.³ Tons of lumber products originated remained virtually constant while industry output advanced by 30 percent. Rail tonnage of both paper and chemical products increased but fell far short of the sizable increases in output for these industries. In such other commodity groups as primary and fabricated metals and miscellaneous manufactured products, rail volume declined in absolute terms although industry output expanded. The exception to this record of decline in rail traffic is the growth in

energy-related commodities. Rail volume of coal increased over 50 percent, while coal output rose by 60 percent; gas and petroleum products increased in tonnage by 15 percent and 46 percent, while industrial output rose by 52 percent for gas and 47 percent for petroleum.

Energy and Transportation: The Linkages Quantified

Energy products are among the most rapidly growing components of the traffic base for both railroads and inland

volume increased by 411 percent (see table 4). These substantial increases in the South and West are attributable mainly to the growth in coal production in those areas. Between 1965 and 1980, coal production grew by 80 percent in the southern states and by about tenfold in the western states.

Tonnage originations of petroleum and gas products for Class 1 railroads have also increased. Petroleum products tonnage across all Class 1 railroads increased from 28 million tons in 1965 to 41 million in 1980. Most of this increase occurred on eastern railroads, while railroads in the

*Since 1955, the rail industry has suffered
a severe decline in market share
in comparison to regulated motor carriers.*

water carriers.⁴ Total tons originated for all Class 1 railroads has remained nearly constant over the 1965-1980 period. Within this overall traffic base, the volume of coal has increased from 363 million tons in 1965 to 523 million tons in 1980, a 44 percent increase. This increase in volume, however, has not been uniformly distributed across regions; eastern rail volume declined by 15 percent while southern rail volume grew by 71 percent and western rail

western and southern districts had marginal increases. Although comparable data do not exist for Class 1 motor carriers for the same period, the Interstate Commerce Commission (ICC) found that the volume of petroleum products transported by Class 1 motor carriers jumped by 86 percent from 1966 to 1976.⁵

Inland waterway operators also increased their transportation of energy-related commodities between 1965 and

Table 1

Performance of the U.S. Transportation Sector Relative to Economic Growth, 1955-1979

Year	Gross national product (in billions of 1972 dollars)	Industrial production (1967=100.0)	Intercity freight ton miles (in billions)						Total
			Class 1 and 2 railroads	Motor carriers	Great Lakes	Rivers and canals	Oil pipelines	Airlines	
1955	654.8	58.4	631	223	119	98	203	0.5	1,274
1960	736.8	66.1	579	298	99	121	229	0.8	1,314
1965	925.9	89.8	709	371	110	152	310	1.9	1,638
1970	1,075.3	107.8	771	412	114	205	341	3.4	1,936
1975	1,202.3	117.8	759	454	99	243	507	3.7	2,066
1979	1,431.6	152.5	927	614	99	303	588	5.0	2,536

Source: *Transportation Facts and Trends* (Washington, D.C.: Transportation Association of America, 1979).

Table 2

Market Share Measures for Class 1 and 2 Railroads and Regulated Motor Carriers, 1955-1978 (In percentage)

Year	Class 1 and 2 railroads			Regulated motor carriers		
	Tonnage	Ton miles	Revenue	Tonnage	Ton miles	Revenue
1955	40.9	49.5	56.0	8.8	17.5	32.5
1960	36.1	44.1	49.0	10.7	21.8	39.1
1965	33.3	43.3	43.8	12.6	21.9	44.5
1970	31.1	39.7	39.8	13.1	21.3	48.9
1975	29.6	36.7	38.8	14.4	22.0	49.1
1978	26.0	35.8	31.9	16.3	24.7	55.6

Source: See table 1.

1978. The amount of coal carried by all inland waterways increased from 138 million tons in 1965 to 183 million tons in 1978 (see table 5). The volume of crude petroleum and refined petroleum products on the inland waterways increased substantially over the 1965-1978 period, with distillate and residual fuel oil being the fastest growing. Gasoline, jet fuel, and kerosene tonnage has remained constant over this period, a fact that suggests that the distribution systems for these commodities may favor motor carrier transport rather than barge transportation.

As a result of the 1973 oil embargo and the subsequent changes in the regulatory posture of pricing energy prod-

ucts, energy prices rose quite steeply during the 1970s. The index of diesel fuel prices, for example, increased 702 percent between 1970 and 1980 (see table 6). The price index for natural gas and gasoline escalated by 315 percent and 242 percent, and the price index for coal increased 437 percent over this period. Energy prices have risen much more rapidly than overall economic activity in the United States; the implicit deflator for GNP, in fact, increased only 94 percent between 1970 and 1980. Not surprisingly, the number of BTUs (British thermal units) consumed for each dollar of real GNP declined from 58,065 in 1970 to 48,172 in 1980, a decrease of 17 percent.

Table 3
Changes in Rail Tonnage and Industrial Production
of Selected Products, 1964-1980
(In percentage)

Commodity	Rail tonnage	Industrial production
Manufactured products		
Food products	- 3.2	68.0
Lumber products	0.0	30.1
Paper products	29.5	81.8
Chemical products	64.3	175.6
Primary metals	-36.6	15.8
Fabricated metals	-77.4	64.9
Miscellaneous manufactured products	-63.9	80.6
Energy products		
Coal	50.2	60.9
Gas	14.6	52.2
Petroleum products	45.8	47.4

Sources: Rail tonnage data from Interstate Commerce Commission, *Freight Commodity Statistics—Class 1 Railroads*, annual issues; industrial production indexes were obtained from the Federal Reserve Board, *Industrial Production*, various issues.

The Quantitative Model for the Railroad Industry

Since annual data obliterate much of the cyclical pattern and all of the seasonality of historical data, the econometric model of this study used quarterly data.⁶ Any analysis of the transportation sector is hampered by a lack of historical information. While Class 1 railroads are required to submit detailed quarterly summary reports (*Quarterly Commodity Statistics*) to the ICC and Class 1 motor carriers are required to submit the same reports annually, these reports contain much information on commodity tonnage and loads, but the data are not compiled into usable time series. For example, no quarterly time series is given for tons, ton miles, or for such individual commodities as coal, petroleum, and grain.⁷ Given these data constraints, the best available data on the output of the transportation industry are the quarterly ton-mile data for the railroads.⁸

Table 4
Class 1 Railroad Tonnage Originations, 1965-1980
(Millions of tons)

Year	Total U.S. tonnage	Coal				Petroleum				Gas
		Eastern district	Southern district	Western district	Total	Eastern district	Southern district	Western district	Total	
1965	1,387	253	75	35	363	8	4	16	28	1.1
1970	1,485	256	100	48	404	9	4	23	36	0.9
1975	1,395	209	112	87	408	18	6	22	46	2.9
1980	1,492	215	128	179	523	14	7	18	41	1.4

Sources: Interstate Commerce Commission, *Freight Commodity Statistics—Class 1 Railroads*, annual issues. Data for 1980 obtained from the Association of American Railroads.

Table 5
Energy Products Transported by Major Inland Waterways, 1965-1978
(Millions of tons)

Year	Coal	Crude petroleum	Gasoline	Jet fuel	Kerosene	Distillate and residual fuel oil
1965	138	44	41	6	4	65
1970	166	54	43	7	3	88
1975	196	52	39	5	2	101
1978	183	57	38	5	2	123

Source: American Waterways Operators, Inc., *Inland Waterborne Commerce Statistics*, annual issues.

In addition to the economic variables that capture the essence of major rail commodity movements, an important interrelation between rail freight demand and demand for other modes, particularly trucking, is captured by the ratio of potential GNP to actual GNP. The greater the gap between potential GNP and actual GNP the lower the demand for rail freight is. In other words, during periods when actual GNP is below potential GNP, the trucking industry (as well as other modes) has excess capacity. Historically, the motor carrier industry (particularly owner-operators) has not been constrained by regulatory agencies and can react quickly to declines in volume through price changes, a marketing tool not commonly used by railroads. The motor carrier owner-operator need not be so competitive in pricing when the economy approaches potential GNP since aggregate transportation demand will exceed available supply. Railroads, therefore, clearly benefit from policies that promote full employment of resources.

To simulate the impact of alternative energy scenarios on rail freight demand, we developed three alternatives. The base case assumes no change in energy policy and implies that coal output will increase at an annual rate of 2.8 percent over the 1983-1990 time period.⁹ The second simulation assumes the implementation of certain objectives that generate a 10 percent increase in coal production over the same period.¹⁰ In the third simulation, a moderate assumption of a 5 percent annual growth rate was made. The long-run forecasts of other variables were held constant so variations in rail demand are attributable exclusively to changes in output relative to the base case. Under the base case, revenue ton miles generated by Class 1 railroads would in-

crease from 857 billion in 1983 to 1,279 billion in 1995 (see table 7). With the highest alternative the rail output jumps to 1,718 billion ton miles by 1995, and with the moderate assumptions output reaches 1,376 billion ton miles in 1995.¹¹

This analysis highlights two important issues. First, even under the base case, continued demand for low-sulfur western coal may well strain the capacity of western railroads by 1985 or 1986. Second, if coal-burning power plants could reduce their air pollution, demand for eastern coal would increase and the deteriorating physical plant of eastern railroads would be called upon to absorb increased traffic demand.

Notes

1. U.S. Department of Energy, *Coal Production Energy Data Report* (Washington, D.C.: Government Printing Office, 1965 and 1980).
2. The Interstate Commerce Commission classifies railroads that have annual gross revenues of \$50 million or more as Class 1 railroads and those with gross annual revenues of \$10 million to \$50 million as Class 2 railroads.
3. The Standard Transportation Commodity Code was instituted in 1964 and, therefore, data for years before that date are not in the same form as data for years after 1964. Data classification after 1964 is very similar to the standard industrial classification (SIC) code system used by the Department of Commerce.
4. The most recent data for the Inland Waterway System, disaggregated by commodity and waterway, are for 1978 and are published by the American Waterways Operators Association, *Inland Waterborne Commerce Statistics* (Arlington, Va: AWOA, 1978).
5. See Interstate Commerce Commission, Bureau of Accounts, *Freight Commodity Statistics—Class 1 Motor Carriers* (Washington, D.C.: Government Printing Office, 1966 and 1976).
6. The results are presented for an annual frequency. Those interested in quarterly simulation results may obtain them from the authors.
7. An industry time series on tonnage (or carloadings) originated for a particular commodity may, however, be constructed by summing the data reported on each individual railroad report.
8. The American Trucking Association publishes a report, *Monthly Truck Tonnage—Class 1 and 2 Carriers of General Freight*, that monitors the volume of this segment of the motor carrier industry.
9. The base case was produced by Data Resources, Inc., *Review* (June 1982).
10. These objectives are outlined in U.S. Department of Interior, Interagency Coal Task Force, *Report on Project Independence Blueprint* (Washington, D.C.: Government Printing Office, 1974).
11. The detailed equation for this model is available from the authors.

Table 6

Price Index of Selected Energy Sources
Compared to Implicit GNP Deflator, 1970-1980
(1967=1.0)

Year	Implicit GNP deflator	Coal	Natural gas	Gasoline	Diesel fuel
1970	1.16	1.52	1.05	1.08	1.06
1975	1.59	4.56	1.87	1.73	3.09
1980	2.25	8.15	4.37	3.68	8.53

Source: Data on implicit GNP deflator from U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, various issues. Coal data from U.S. Department of Energy, *Price and Quality to Electric Utilities*, various issues. Natural gas data from Natural Gas Association, *Gas Facts*, various issues. Gasoline and diesel fuel data from U.S. Department of Energy, *Monthly Energy Review*, various issues.

Table 7

Effect of Coal Production Alternatives on Rail Freight Demand
(Billions of revenue ton miles)

Year	Base case	High coal production	Intermediate coal production
1983	857	915	898
1985	966	1,048	1,005
1990	1,134	1,336	1,188
1995	1,279	1,718	1,376

Note: The assumed annual increase in coal production is 2.8 percent for the base case, 10 percent for high production, and 5 percent for intermediate production.

The Financial Performance and Prospects of Railroads in the South and Southwest

Curtis M. Grimm

Robert G. Harris

Most economic indicators show that over the last few years railroads in the South have maintained a consistently stronger economic condition than have railroads in the North. Northern railroads, however, have improved consistently and dramatically in most indicators over the last half decade and in some instances have been the major contributors to the economic improvement of the railroad industry.

In 1980, U.S. railroads hauled 1.5 billion tons of freight an average distance of 590 miles, with total freight revenues exceeding \$26 billion. By any measure of output (tons, ton miles, or revenues), railroads now carry considerably more freight than they did in the past. For long-distance movement of large volumes of bulk commodities, railroads are often the most efficient means of transportation. In spite of absolute gains in revenues and physical output, however, the rail industry has been steadily losing ground to other modes: water carriers for bulk commodities, pipelines for liquids and liquified commodities, and motor carriers for manufactured commodities. Thus, from 1940 to 1975, the rail industry's share of total freight revenues fell from 76 percent to 38 percent, while motor carriers increased their market share from 17 percent to 53 percent.¹

Not surprisingly, the industry did not fare well financially during this period. Throughout the postwar period, rail profits have been consistently below those earned in other industries and significantly below the long-run cost of capital to the industry. During the past decade, public policy toward railroads has acknowledged the industry's

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low and declining profitability, punctuated by bankruptcies and loss of service in the Northeast and Midwest. The debate and resolution of the so-called railroad problem has centered on northern rail carriers, but the performance and prospects of southern and southwestern railroads have not received such intense public scrutiny.

The standard reporting practice of the Interstate Commerce Commission (ICC) segregates rail carriers into three districts: East, South, and West. We have divided the ICC's western district into two parts, the northwestern (including parts of California and Illinois and all of the states of Colorado, Idaho, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, Oregon, South

*Because of a substantial
reduction in work force
and an enormous investment
in structures and equipment,
the rail industry has become
more capital intensive.*

Dakota, Utah, Washington, Wisconsin, and Wyoming) and the southwestern (including the southern portion of California and all of Arizona, Arkansas, Louisiana, New Mexico, Oklahoma, and Texas). The seventeen western carriers were split correspondingly into two roughly equal groups according to the region in which most or all of their mileage lies.² In making this division, we extended westward the latitudinal cut between ICC's eastern and southern districts,

enabling us to make north-south as well as east-west comparisons.

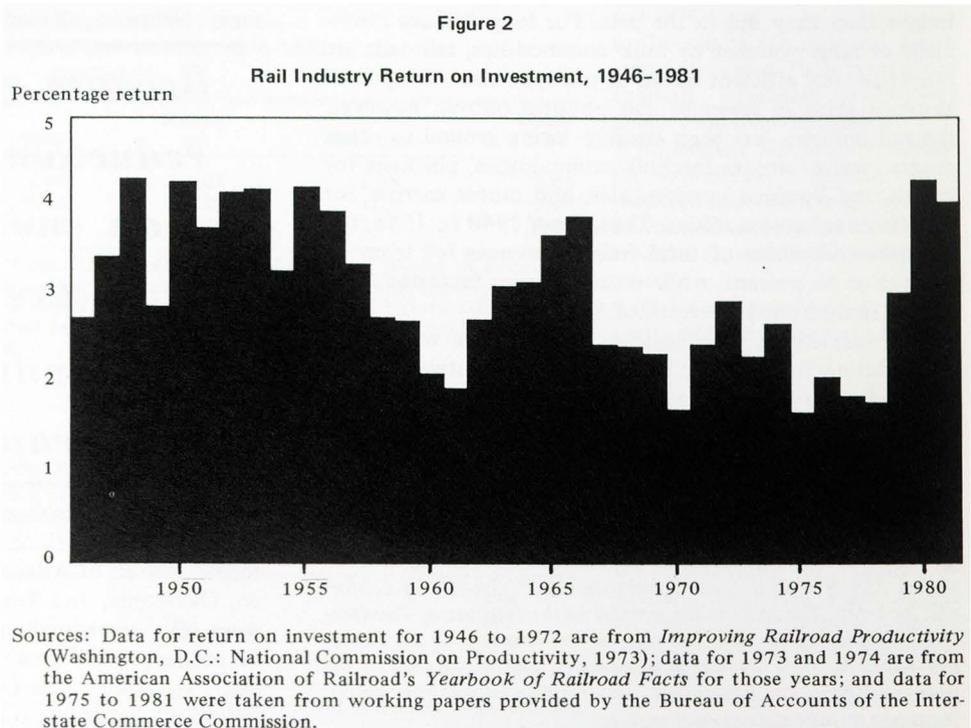
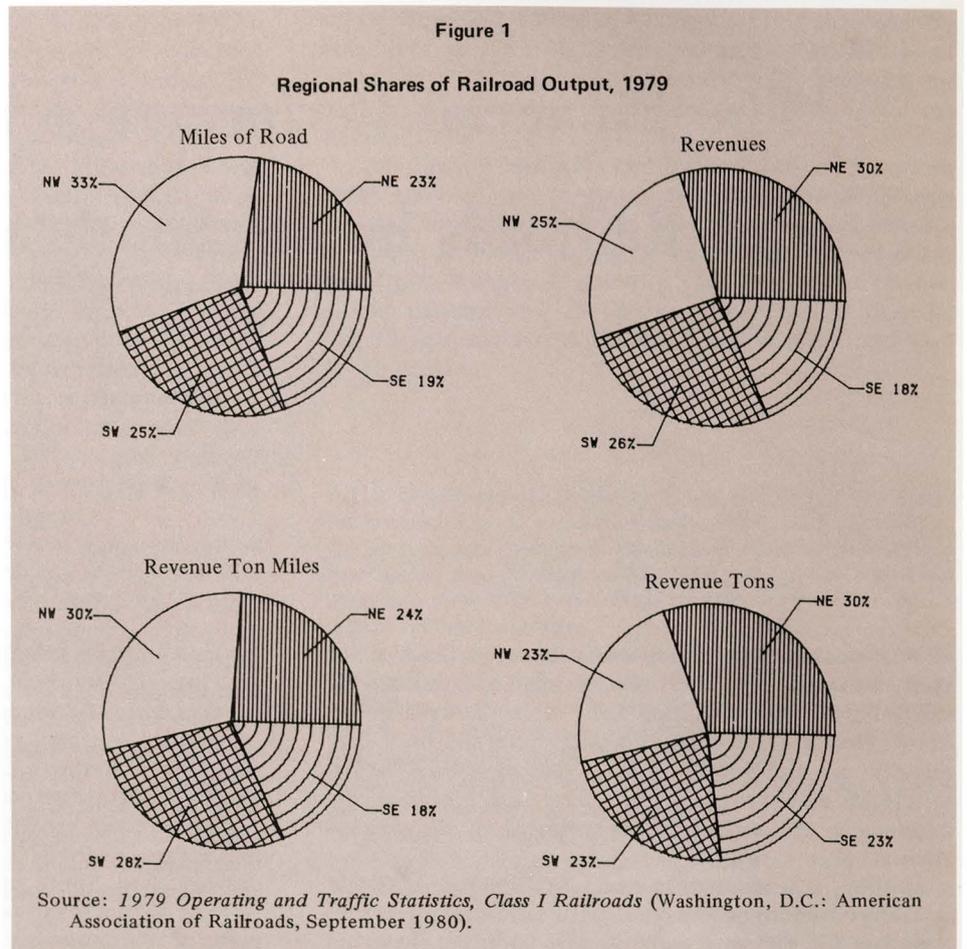
The western regions have 58 percent of rail mileage, but only 51 percent of operating revenues (see figure 1). By comparison, the northeastern region alone has 30 percent of revenues, but only 23 percent of route mileage, in spite of the conventional wisdom that the Northeast suffers acutely from lower traffic densities. Lengths of haul differ substantially across the regions, as indicated by the western regions having only 46 percent of revenue tons, but 58 percent of ton miles.

Historical Trends in the Rail Industry

Perhaps because of its age, the rail industry is generally perceived as static, with few significant changes in industry structure, technology, operations, or performance for years, but this public image substantially distorts reality. Though the industry has had a more or less continuous financial decline for several decades, the structure and operations of the industry have changed fundamentally over the same period. The industry has been virtually transformed in the past thirty-five years.

Rail passenger service has declined dramatically. During World War II, railroads carried record levels of passengers; even after the war, in 1947, railroads carried almost 46 billion passenger miles, a sizable share of total intercity rail passenger miles. Yet by 1980, U.S. railroads had virtually left the intercity passenger market, carrying fewer than 6 billion intercity passenger miles, and that service was provided mostly by a highly subsidized public enterprise, National Rail Corporation (Amtrak).

The nature of rail freight operations have also changed dramatically during the postwar period. Revenue ton miles in-



creased from 650 billion in 1947 to more than 900 billion in 1980, while revenue carloads fell from 44 million in 1947 to 22.5 million in 1980. This change reflects the increasing scale of production in the industry: the average length of haul increased from 407 miles in 1947 to 590 in 1980, the average freight car capacity rose from 51.5 tons to 78.5 tons, and the average train size increased from 52 cars on each train to 68. These operating indices point to the transformation of railroads from retailers of freight services (offering many single or few-car shipments) to transportation wholesalers (moving bulk commodities and offering unit trains and piggyback service).

Although public attention has focused on rail disinvestments (bankruptcies, abandonments, and transfers of assets), a third change in the industry has been enormous amounts of new investment. In just the past fifteen years, Class I railroads have spent some \$28 billion for locomotives, equipment, and structures.³ This number actually understates investment since most expenditures for rebuilding track and structures are treated as current expenses. In the same period, railroads spent more than \$45 billion replacing and rehabilitating their rights-of-way and structures. A substantial part of the rail system, thus, has been completely replaced during the very period in which rail profits were stabilized at very low levels. This "new" rail system has heavier rail, more automated train controls and switching, more powerful locomotives, and larger (and more specialized) cars.

The industry has also been dramatically restructured physically and corporately. In the past thirty-five years, railroads have abandoned 51,802 miles of their route systems, a 20 percent reduction in the extent of the rail network. Traffic flows have been concentrated over the network as larger shares of rail output move over a smaller share of the rail network; in effect, a railway equivalent of the Interstate Highway System has been created. Of equal importance, the corporate structure of the industry bears little resemblance to that of thirty-five years ago. After numerous mergers and consolidations, the eight largest rail systems now account for 76 percent of total Class I route mileage and 84 percent of operating revenues.⁴

Finally—and quite contrary to public perception—rail employment has fallen from 1.3 million in 1947 to less than 500,000 in 1980. Thus, given the enormous investment in structures and equipment and the substantial reduction in its work force, the rail industry is far more capital intensive than it was in the past. In an industry that is capital intensive the ability to attract capital for replacement and new investment is critical. Thus, return on investment is a critical indicator of the industry's performance and prospects.

Given the important differences between accounting methods used in railroading and those used in other industries, no single indicator accurately measures rail financial performance. According to economic theory, the return on investment earned by a company (or industry) must be equal to, or exceed, its cost of capital in order for the firm to be viable in the long term. Moreover, standards for revenue adequacy recently established by the ICC desig-

Table 1
Return on Investment by Railroad Carriers, 1977-1981
(In percentage)

Region Carrier	1977	1978	1979	1980	1981	1977-1981
Northeast	- 5.68	- 6.46	- 1.85	0.22	3.05	- 1.76
Baltimore & Ohio	6.87	4.79	4.45	3.82	2.37	4.39
Bessemer & Lake Erie	9.89	11.58	11.66	11.96	8.90	10.81
Boston & Maine	- 3.51	- 0.76	- 2.63	2.98	- 0.99	- 0.96
Chesapeake & Ohio	0.59	2.15	4.59	6.82	5.38	3.99
Conrail	-39.87	-39.04	-24.58	-13.41	- 2.54	-19.87
Delaware & Hudson	-15.18	- 9.58	- 7.66	- 6.61	- 7.48	- 9.45
Detroit, Toledo & Ironton	3.97	5.73	5.06	- 1.56	- 0.55	2.34
Elgin, Joliet & Eastern	8.38	16.49	13.31	3.58	3.89	8.63
Grand Trunk Western	3.15	1.96	2.54	- 0.01	2.99	2.09
Norfolk & Western	6.41	4.30	8.93	9.47	10.77	8.06
Pittsburgh & Lake Erie	4.10	5.21	10.07	18.18	2.75	7.12
Western Maryland	4.84	4.92	9.63	4.23	5.72	5.87
Northwest	3.12	3.42	3.11	4.87	3.57	3.63
Burlington Northern	2.27	3.01	4.11	5.22	4.30	3.87
Chicago & Northwestern	2.10	0.30	- 2.36	3.78	3.84	1.18
Milwaukee Road	-10.68	-13.45	-20.61	-21.46	-39.09	-19.99
Colorado & Southern	5.61	- 3.19	- 5.30	7.73	4.75	2.05
Denver & Rio Grande	7.10	8.31	8.58	9.04	8.10	8.26
Duluth, Mesabi & Iron Range	2.71	4.70	6.12	7.09	6.13	4.38
Soo Line	6.77	7.81	8.16	9.46	8.13	8.11
Union Pacific	6.83	7.77	7.64	7.84	7.41	7.51
Western Pacific	4.35	4.35	3.35	3.40	-10.14	1.81
Southeast	5.36	5.32	5.60	6.06	5.04	5.47
Clinchfield	13.13	10.67	11.57	19.30	18.07	14.90
Florida East Coast	5.32	7.99	1.48	5.71	3.33	4.60
Illinois Central Gulf	0.46	0.27	- 2.23	- 0.46	- 1.35	- 0.67
Louisville & Nashville	4.42	1.89	5.06	5.54	7.04	4.84
Seaboard Coast Line	6.18	7.85	7.19	7.16	2.10	6.00
Southern System	8.05	8.36	9.10	8.45	8.30	8.46
Southwest	5.05	5.25	5.43	6.04	4.79	5.32
Sante Fe	3.85	5.04	5.87	7.12	5.00	5.43
Fort Worth & Denver	3.52	10.94	22.78	18.92	21.85	16.32
Kansas City Southern	4.62	7.11	6.56	7.78	7.61	6.91
Missouri-Kansas-Texas	1.59	4.98	5.72	5.59	11.82	6.54
Missouri Pacific	9.39	8.42	8.37	8.22	7.98	8.42
St. Louis-San Francisco	5.37	6.80	5.83	6.60	0.00	6.16
St. Louis Southwestern	7.73	7.47	7.51	5.83	3.93	6.29
Southern Pacific	2.69	1.74	1.55	2.63	0.50	1.78
National averages	1.86	1.79	3.01	4.23	4.05	3.07

Source: U.S. Interstate Commerce Commission, Bureau of Accounts, working papers.

nated return on investment as the best single indicator of a rail carrier's financial performance. The commission further found that, unless a carrier's return on investment is at least equal to the prevailing cost of capital (as measured by current capital market indicators), that carrier is not earning enough to attain or maintain financial viability.

Between 1947 and 1981, however, the industry's national rate of return consistently lagged far below the cost of capital, which averaged 10 percent to 15 percent during this period (see figure 2).⁵ Return on investment fluctuated little from year to year, staying within a remarkably narrow range, perhaps because of the practice of deferring maintenance in periods of low income and greatly increasing such expenditures when revenues are high (since betterment accounting treats maintenance as a current expense this practice would smooth out profit fluctuations over time). Recent annual results show a marked reversal of the long decline in return on investment. National rates of return were 3.0 percent in 1979, 4.2 percent in 1980, and 4.0 percent in 1981; the 1980 return on investment was the industry's highest since 1955.

Regional Differences in Industry Performance and Structure

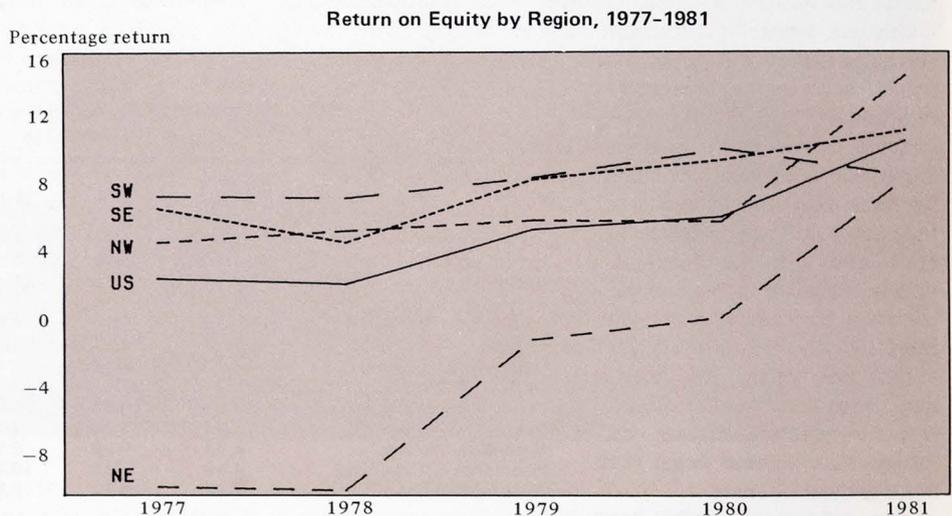
For most carriers, with a few notable exceptions, return on investment was relatively stable from 1977 to 1981 (see table 1). Conrail improved dramatically over the last five years, coming close to breaking even in 1981. Among southern railroads, both the Missouri-Kansas-Texas (Katy) and the Fort Worth and Denver experienced the strongest gains in return on investment. Not surprisingly, the Milwaukee Road, which declared bankruptcy during this period, suffered the sharpest decline.

When return on investment from 1977 to 1981 is examined by region, Conrail's improved performance results in a significant improvement in northeastern return. In turn, northeastern improvement appears to be the major determinant of the improvement in national return on investment during this period, since the profit performances of the other three regions have

remained relatively stable. The southeastern and southwestern carriers have consistently earned higher rates of return than their northern counterparts. These differences persisted through 1981, despite the Northeast's improvements.⁶

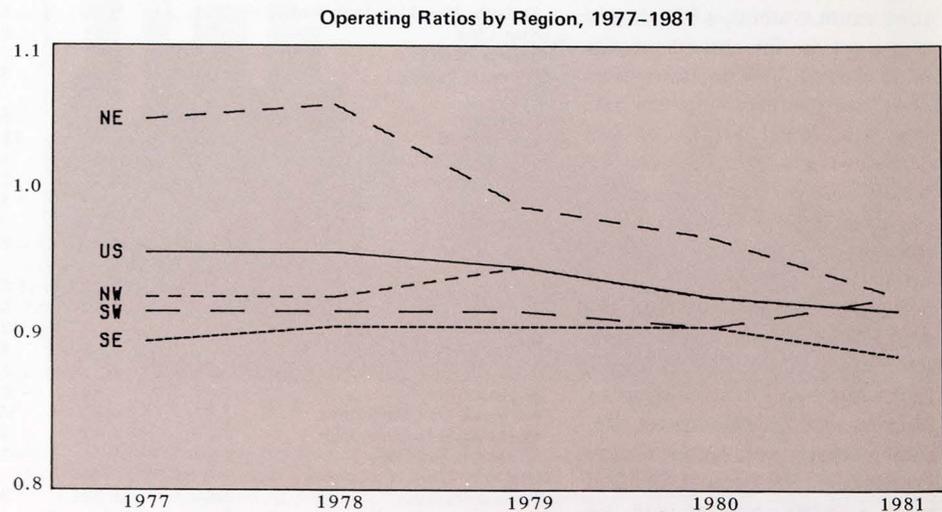
Examination of other financial indicators, such as return on equity and operating ratios, corroborates these regional differences. The five-year composite figures on return on equity are highest for the Southeast and Southwest, though both northern regions have shown strong improvement in recent years—particularly in 1981 (see figure 3). Operating ratios, which are operating expenses divided by operating revenues, provide an indication of performance over a shorter period. Again, the composite ratios are superior for the two southern regions, with the Northeast showing dramatic improvement over the last five years (see figure

Figure 3



Source: Working papers of the Bureau of Accounts, Interstate Commerce Commission.

Figure 4



Source: Same as figure 3.

4). Regional operating indicators (including ratios involving miles of track, miles of road, average length of haul, revenues, car miles, cars, trains, and tons) are of interest in themselves as well as for their ability to explain differences in regional performance. The ratio of miles of track to miles of road (often there are several tracks over a particular section of road) is higher for the Northeast than it is for the other three regions, perhaps because of the greater numbers of cities and of concomitant switching and terminal track that are required (see table 2). Traffic densities, as measured by the ratio of revenue ton miles to miles of road, are higher for the Northeast and Southwest. If we instead use the ratio of revenue ton miles to miles of track, the Northeast has significantly lower densities than the other three regions. Carriers in the two eastern regions have substantially shorter average lengths of haul. Contrary to public perception, revenues on each car mile are higher in the Northeast than they are in the other three regions. Trains are longer, on average, in the North, while the northwestern carriers haul more tons to the car, probably because of a greater percentage of coal and bulk agricultural shipments.

In 1976 in both the Northeast and the Northwest, low-density lines constituted a higher percentage of total mileage than they did in the southern regions (see table 3). Furthermore, the southern regions have a greater percentage of lines with the highest density (that is, more than 20 million gross ton miles per mile of road). Because of the relatively high overall density in the Northeast, we can conclude that this region must have some lines with very high overall densities but is saddled with significant amounts of low-density line.

Industry rationalization—the reduction of excess route mileage—has occurred over a very long time. That process has accelerated in recent years because of more lenient public policies: from 1961 to 1970, rail lines were abandoned at an average rate of 1,365 miles a year; in the past decade, route abandonments increased to an annual rate of 2,150 miles.⁷ Although social costs are obviously associated with these abandonments, route rationalization was one of the essential steps toward industry revitalization. Furthermore, we can expect additional reductions in route mileage in this decade, including the abandonment of branch and duplicate parallel lines and perhaps the bankruptcies of the few remaining weak carriers (those with very low rates of return and very poor long-term prospects). It has been estimated that approximately 35,000 miles of rail line did not earn revenues sufficient to cover the costs of continued service in 1977 (see table 4).⁸ According to these estimates, the southern carriers have much less excess capacity than northern carriers. Considering that only 15,000 miles have been abandoned since that study was completed, we

should expect on the order of 15,000 to 20,000 miles in additional abandonments in the decade ahead.

Prospects for Rail Carriers

During the past decade, federal rail policy (culminating in the 1980 Staggers Act) has steadily eased rail regulatory burdens and allowed competitive forces to operate in the rail industry. The common theme in recent legislation and regulatory implementation has been to give rail managers and shippers the opportunity to chart their own courses. Carriers, not regulatory bodies, are to decide which markets to serve, what rates to charge, what structural configuration to choose, and how (or even whether) to coordinate joint routes and rate divisions with connecting carriers. Carriers and shippers are free to negotiate contracts and are heartily encouraged to do so by the ICC. Fresh fruits and vegetables and piggyback traffic are now completely exempt from ICC control, and carriers may design service, pricing, and marketing as they choose with few regulatory constraints.

To a large extent then, rail managers, not public policy makers, must bear the onus for their own financial future. Regulatory reform has given them greater opportunities for profit, but it is not, by itself, a panacea. Regardless of the ICC's final determination of reasonable rates for commodities that dominate markets, future rate increases should not be inordinately large. Commodities and shippers now captive to rail will turn to substitutes in the longer term if railroads overly exploit opportunities for short-term profits.

Carriers in the North may in some respects be better equipped to cope with the new regulatory environment. Because they have had to face harder times in previous years and have been more adversely affected by many of the regulatory restrictions, such carriers as Conrail may now be better equipped to take advantage of new freedoms. Indeed Conrail has been a leader in exploiting new freedoms to cancel routes, surcharge joint rates, and redesign rate levels and structure.

Many recent signs indicate that railroads will rise to the new challenge. A number of recent mergers have been motivated partly by the carriers' belief that consolidation will allow better positioning in the new regulatory environ-

Table 2

Rail Operating Statistics, 1979

Region	Miles of track to miles of road	Revenue ton miles to miles of road	Average length of haul (in miles)	Revenues to car miles	Cars to trains	Tons to cars
Northeast	2.03	5.03	275	1.93	70	56
Northwest	1.51	4.61	482	1.41	71	63
Southeast	1.60	4.69	283	1.52	62	56
Southwest	1.56	5.43	428	1.36	65	53
National	1.66	4.93	359	1.54	67	57

Source: 1979 *Operating and Traffic Statistics* (Washington, D.C.: American Association of Railroads, September 1980).

ment; thus, firms are actively substituting internal organization for administrative control and many are trying to improve management philosophies and personnel. Rail management had become stagnant after years of regulation since young, talented management had not been attracted to the industry. Several rail firms, however, have recently sought outside expertise to improve planning and management.

The attitude of shippers and state and local officials will also influence rail prospects and efficient allocation of transportation resources. Shippers have begun to abandon their adversarial relationship with railroads; cooperation, not only on rates but also on logistics and distribution, is increasing. States are using formal procedures to evaluate lines in considering abandonments and low-density lines. Local focuses in which effects on a specific region are calculated, but gains to other regions are not, should be avoided. State officials will have to resist strong political pressures to continue rail service unless that continuation is justified by careful cost-benefit analyses. Many states do not oppose abandonments as often as they did before and are attempting to promote greater harmony between shippers and rail carriers to seek private and local solutions to unprofitable service.

Some states are actively acquiring abandoned lines and promoting short-line operations. Early experience with short-line railroads appears to be mixed. By eliminating excess labor costs and promoting better relations with shippers, short-line railroads can operate more efficiently than their predecessors, but, in some cases, prospective operators

have underestimated rehabilitation and maintenance costs and have overlooked such expenses as insurance. Quality of management has also varied sharply.

Unresolved issues remain for federal policy makers as well. Proceedings regarding rate reasonableness have not yet been resolved. The ICC exemption program has yet to explore many commodities and services. Important mergers are still to be decided and more may be forthcoming. Resolution of the rate bureau issue and decisions on exactly what kinds of cooperative behavior will be allowed among competing railroads are yet forthcoming. The issue of adequate protection for small railroads in this era of giants has not been resolved adequately, either. In resolving these remaining issues, the ICC must pay careful attention to early results of regulatory reform. Deregulation policies must take into account the quite substantial institutional idiosyncracies of the rail industry.

The rail industry has made substantial progress in recent years toward achieving a stable, healthy condition. Having undergone fundamental changes in economic structure, managerial practice, and public policy, the industry has begun the process of renewal. Though it is too soon to claim that revitalization has occurred, there is sufficient evidence to indicate that the rail industry will, by the end of this decade, achieve a reasonable measure of financial success and thereby assure its continuing role as a critical component in the national transportation system.

Notes

1. Unless otherwise noted, data reported in this article are from various annual editions of the *Yearbook of Railroad Facts*, published by the American Association of Railroads (Washington, D.C.), or *The Railroad Situation: A Perspective on the Past, Present and Future of the Railroad Industry*, published by the U.S. Department of Transportation (Washington, D.C.: Government Printing Office, March 1979).
2. The carriers included in the southwestern region in this article correspond exactly with those in Charles Zlatkovich, "The Railroads of Texas," *Texas Business Review*, July-August 1980, pp. 193-200.
3. *Class I railroads* were defined by the ICC in 1978 as those making at least \$50,000 annually. Class I carriers account for 98 percent of all rail traffic in the country, operate 94 percent of all rail mileage, and employ 92 percent of all rail workers. Lines that are not Class I carriers are called *short lines*. See Zlatkovich, "The Railroads of Texas," pp. 193 and 198.
4. The eight largest rail systems (including the most recent consolidation, that between the Norfolk & Western and the Southern, and based on 1979 operating statistics) are the Atchison, Topeka and Santa Fe; Burlington Northern; Conrail; CSX; Missouri Pacific; Norfolk & Southern; Southern Pacific; and Union Pacific.
5. T. E. Keeler, *Public Policy toward Rail Freight Transportation* (Washington, D.C.: Brookings Institution, forthcoming).
6. Formal statistical methods, including both parametric and non-parametric difference of means tests, confirm a statistically significant difference between northern and southern carriers.
7. Keeler, *Public Policy toward Rail Freight Transportation*, table 17.
8. Robert G. Harris, *Restructuring the Railroads: Cost Savings from Branchline Abandonments* (Washington, D.C.: Federal Railroad Administration, December 1977).

Table 3

Rail Mileage by Traffic Density, 1976
(In percentage)

Region	Ratio of gross ton-miles to miles of road		
	Less than 5 million	5-20 million	More than 20 million
Northeast	50	26	24
Northwest	61	27	12
Southeast	44	27	29
Southwest	41	26	33
National	50	26	24

Source: Robert G. Harris, *Restructuring the Railroads: Cost Savings from Branchline Abandonments* (Washington, D.C.: Federal Railroad Administration, December 1977).

Table 4

Total Rail Mileage and Unprofitable Mileage, 1976

Region	Total miles	Unprofitable miles	Percentage of miles unprofitable
Northeast	53,768	10,930	20
Northwest	84,770	15,180	18
Southeast	31,851	4,451	14
Southwest	35,185	4,741	13
National	205,573	35,301	17

Source: See table 3.

Regional Differences in Attitudes toward Work

Norval D. Glenn

Charles N. Weaver

The traditional stereotype of the southern worker as having little commitment to work, being on the average less industrious and dependable, and being more pleasure-oriented than other U.S. workers becomes more important as more managers of companies consider relocating to the Sunbelt. Survey data indicate that there may be no basis for the stereotype of the lazy, pleasure-loving southerner and that in crucial respects the work attitudes of southern and nonsouthern workers seem to be essentially identical. In fact, the largest regional differences in attitudes toward work are consistent with the thesis that the work ethic is stronger in the South than it is elsewhere.

Historical Roots of the Stereotype

The stereotype of the lazy, unmotivated southerner appears in the writings of such nineteenth century observers of the American scene as Frederick Law Olmstead and Alexis de Tocqueville. The former, writing in a New York newspaper, claimed that the "Southerner has no pleasure in labor except with reference to a result. He enjoys life itself. He is content with being."¹ In a similar vein, de Tocqueville wrote that the resident of the upper South "scorns not only labour, but all of the undertakings which labour promotes; . . . his tastes are those of an idle man."² Similar views have persisted into this century; according to John Shelton Reed, the "paramount characteristic of Southerners, in the view of twentieth-century Americans,

seems to be their relative (if only relative) lack of ambition, energy, and industry."³

Opinion polls conducted in recent years have yielded results consistent with Reed's conclusion. Gallup polls conducted over the past thirty years have found, for instance, that nonsoutherners very often use such terms as *lazy*, *shiftless*, and *unambitious* to characterize southerners. The view of the lazy, undependable southerner has even found support in academic circles: a scholarly book published in 1967 was entitled *The Lazy South*.⁴

How accurate are these pervasive negative views of the southern worker? One might think that the answer to that question could be found in the hundreds of publications by social scientists who have systematically studied attitudes toward work in the United States. Surprisingly, however, the large literature on work attitudes provides no answer nor does it provide any systematic evidence at all on this question. Although a few publications deal incidentally with regional differences in work orientations and a few even present some data on the subject, there has apparently not been any attempt to answer specifically the question we have posed here.

Survey Data

We recently analyzed data from seven U.S. national surveys conducted from 1955 to 1980. In June of 1955, the American Gallup poll asked two questions: "Do you enjoy work so much that you have a hard time putting it aside?" and "Generally speaking, which do you enjoy more—the hours you are on your job or the hours when you are not on your job?" We commissioned a reiteration of these questions on a Gallup survey conducted in May 1980, almost exactly a quarter of a century after the first asking of the questions.

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We also studied the responses to nine questions on each of five surveys conducted by the National Opinion Research Center (NORC) at the University of Chicago from 1974 to 1980. These questions dealt with general job satisfaction, the relative importance of luck and hard work in getting ahead, the desire to work in the absence of the need for money, and the relative importance of five different characteristics of jobs. An additional question, deal-

ing with the importance of money, was considered to be at least marginally relevant.

If the traditional stereotype of the southerner is correct, then southern workers, as a whole, should report less enjoyment of work, less job satisfaction, less faith in the efficacy of hard work, less desire to work in the absence of a need for money, and less concern for money than workers in other parts of the United States. Southern workers should also be more concerned with the security and free time provided by jobs than with opportunities for high earnings or with chances for progressing to more highly rewarded work.

We first compared the responses of employed persons in the southern states with those of employed persons in the remainder of the contiguous United States (see table 1). We then adjusted the percentages, through use of a technique called *multiple classification analysis*, to remove the effects of regional differences in age, occupation, race, and gender.⁵ The adjusted percentages should more nearly reflect regional cultural differences than the raw percentages, although the former could also be affected somewhat by regional differences in job opportunities and working conditions at the times of the surveys. Therefore, we took the two NORC questions in which the differences between the raw percentages for the South and non-South were statistically significant and were not reduced by the adjustment procedure and we computed adjusted percentages for people who lived in the South and in the non-South at age 16, with adjustments to remove the effects of current region as well as the effects of the other control variables (see table 2). Differences between these percentages should reflect regional cultural differences almost exclusively.

Table 1

Employed Respondents to U.S. Surveys Giving Specific Responses to Questions Concerning Work-Related Values and Attitudes (In percentage)

Response Survey	South*	Non-South*	Difference
Said they enjoyed their work so much it was hard to put it aside			
1955 (raw)	59.5	48.3	11.2†
1955 (adjusted)	58.7	48.3	10.4
1980 (raw)	41.1	31.8	9.3†
1980 (adjusted)	39.6	33.8	6.6
Said they enjoyed hours on the job more than hours not on the job			
1955 (raw)	47.7	36.7	11.0†
1955 (adjusted)	44.8	37.3	7.5
1980 (raw)	28.4	22.6	5.8
1980 (adjusted)	24.9	21.7	3.2
Said they were very satisfied with their work			
1974-1980 (raw)	53.4	48.1	5.3†
1974-1980 (adjusted)	57.8	49.8	8.0
Said they would continue to work even if they were to get enough money to live comfortably the rest of their lives			
1974-1980 (raw)	71.3	70.3	1.0
1974-1980 (adjusted)	69.8	68.1	1.7
Said they think people get ahead more by their own hard work than by luck			
1974-1980 (raw)	62.0	61.4	0.6
1974-1980 (adjusted)	63.6	60.8	2.8
Disagreed with statement that "next to health, money is the most important thing in life"			
1974-1980 (raw)	74.9	71.9	3.0
1974-1980 (adjusted)	79.7	74.7	5.0
Said the most important thing about a job is that it provide			
High income			
1974-1980 (raw)	24.2	17.1	4.1†
1974-1980 (adjusted)	20.1	15.5	4.6
No danger of being fired			
1974-1980 (raw)	6.4	7.6	-0.7
1974-1980 (adjusted)	5.3	7.0	-1.7
Short working hours, plenty of free time			
1974-1980 (raw)	6.0	4.3	1.7
1974-1980 (adjusted)	6.3	4.8	1.5
Chances for advancement			
1974-1980 (raw)	17.7	16.8	0.9
1974-1980 (adjusted)	14.5	16.1	-1.6
Important work that gives a feeling of accomplishment			
1974-1980 (raw)	45.7	54.2	-8.5†
1974-1980 (adjusted)	53.8	56.6	-2.8

*The South includes Delaware, Maryland, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Oklahoma, Louisiana, and Texas. The non-South includes all other states except Alaska and Hawaii.

†Statistically significant. Significance tests are not applicable to the differences between the adjusted percentages.

Note: Responses to 1955 survey: 222 for South and 573 for non-South; to 1980 survey: 275 for South and 552 for non-South; to 1974-1980 survey: 725 for South and 1,150 for non-South. Adjusted percentages reflect the removal of the effects of regional differences in age, occupation, race, and gender.

Survey Findings

These data provide virtually no support for the traditional stereotype of the lazy, pleasure-

loving southerner. All of the differences between southern and nonsouthern responses are either very small or are opposite those expected if the stereotype were accurate. The only shred of evidence clearly consistent with the stereotype is that a slightly larger percentage of the southern respondents than nonsouthern respondents said that the most important thing about a job is that it provide short working hours and plenty of free time. The difference, however, falls short of statistical significance, and, thus, we cannot be confident that it did not result from sampling error. The difference is, in any event, too small to be very important. The only other difference that could possibly support the stereotype is the slightly larger percentage of southern respondents who disagreed with the statement that "next to health, money is the most important thing in life." The relevance of this difference is problematic, and, in view of the fact that a larger percentage of southerners than of the other respondents said that the most important thing about a job is that it provide high income, it would seem unlikely that southerners are any less eager to acquire money than other U.S. workers.

The two questions that test most directly the traditional stereotype of the southerner are the one dealing with the desire to work in the absence of financial need and the one about the relative importance of luck and hard work. Responses of the workers from the two broad regions are very nearly the same for each question, but both the raw and adjusted percentages show a slightly larger proportion of "work-oriented" responses from the southerners. Thus, the most crucial evidence we have indicates that the stereotype is not correct.

The largest regional differences are in the responses to questions concerning enjoyment of work and job satisfaction, to which the southern workers gave a larger percentage of positive responses by margins that, while not huge, are large enough to be of some importance. The meaning of these differences is unclear, however, since they are subject to at least three distinctly different interpretations. One interpretation would attribute regional differences in responses to differences in current conditions, such as job

opportunities. Two cultural interpretations can also be made.

The first possible cultural interpretation is that the greater reported enjoyment of work and job satisfaction in the South reflects a greater interest in and commitment to work. In recent years, southern chambers of commerce and state agencies formed to attract industry have often claimed, in a reversal of the traditional stereotype, that in their states or cities "the work ethic is alive and well." If the level of reported enjoyment of work is a good indicator of the strength of the work ethic (and it may not be), the work ethic would not seem to be "well" in the South, in view of the substantial decline in the level of reported enjoyment of work from 1955 to 1980, but it may be less nearly extinct in the South than in the rest of the country.⁶

The second cultural interpretation is that the higher level of reported enjoyment of work and job satisfaction in the South reflects nothing more than low expectations and a traditional tendency for southerners to be content with their lot, whatever it might be. If this interpretation is correct, then the findings are consistent with an element of the traditional stereotype of the southerner, even though they do not support the part of the stereotype we have tried to test.

Any choice between these two cultural interpretations must await a more detailed and searching study of regional differences in work attitudes and values, but we do have evidence that can help us to decide whether or not any cultural interpretation is credible. If the work attitudes of southern workers are affected by a distinctive cultural heritage, people who grew up in the South but did not remain there as adults should be affected by the heritage as well as people who currently live in the South. Thus, those who lived in the South at age 16 should have the distinctive cultural attitudes when the effects of current region of residence are removed. People who lived in the South at age 16 did in fact report higher job satisfaction than the other respondents, and region at age 16 made somewhat more difference than current region. Therefore, either of the cultural interpretations may be correct.

The adjusted percentages of workers who said that the most important thing about a job is that it provide high income also suggest distinctive cultural influences on work attitudes in the South, since region at age 16 made a great deal more difference than current region did. Although there does seem to be something distinctive about southern cultural attitudes toward work and money, so far as we can tell from the data presented here the distinctiveness is not pronounced and in at least some respects is not consistent with the traditional stereotype of the southerner.

Table 2

Respondents to National Surveys Giving Specific Responses to Two Questions Concerning Work-Related Attitudes by Region at Age 16 and by Current Region (In percentage)*

Response Survey	South	Non-South	Difference
Said they were very satisfied with their work			
Current region with effects of region at age 16 removed	55.1	51.1	4.0
Region at age 16 with effects of current region removed	56.3	50.3	6.0
Said the most important thing about a job is that it provide high income			
Current region with effects of region at age 16 removed	17.5	16.8	0.7
Region at age 16 with effects of current region removed	19.6	15.9	3.7

*Adjusted to remove the effects of differences in age, occupation, race, gender, and current region or region at age 16.

These findings are only a first step toward the needed evidence concerning regional differences in work attitudes in the United States, and thus all conclusions must be tentative, but the evidence at this stage would make one skeptical about the accuracy of the stereotype of the lazy, pleasure-loving southerner. There are theoretical reasons for this skepticism also. Social scientists working in the tradition of Max Weber, the German sociologist who claimed there was a close relation between the Protestant Reformation and the emergence of capitalism, have long believed that ascetic Protestantism and the work ethic are linked; of course, ascetic Protestantism has been, and still is, stronger and more pervasive in the South than in most other parts of the United States.⁷ Since the largest regional differences in attitudes shown in these surveys suggest that the work ethic is stronger in the South than elsewhere, perhaps further research on regional differences in work attitudes should be guided by the working hypothesis that southern workers are more, rather than less, committed to work than other American workers.

Notes

1. As quoted in John Shelton Reed, *The Enduring South* (Lexington, Mass.: D. C. Heath, 1972), p. 30.
2. As quoted in *ibid.*
3. *Ibid.*
4. David Bertelson, *The Lazy South* (New York: Oxford University Press, 1967). Bertelson, however, is more tentative in his conclusions than the title of the book would suggest.
5. Multiple classification analysis is a form of dummy variable regression analysis that enables one to study relations between one variable and other variables.
6. For detailed discussion of the decline in reported enjoyment of work, see Norval D. Glenn and Charles N. Weaver, "Enjoyment of Work by Full-time Workers in the U.S.: 1955 and 1980," *Public Opinion Quarterly* 46 (Winter, 1982).
7. See Max Weber, *The Protestant Ethic and the Spirit of Capitalism*, trans. Talcott Parsons (London: George Allen and Unwin, 1930). The empirical evidence concerning the alleged link between ascetic Protestantism and the work ethic is ambiguous.

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The Erosion of the Terminable-at-Will Doctrine in Employee Discharge Cases

David B. Stephens

The employer-employee relationship in the United States has long been governed by the terminable-at-will doctrine—the assumption that employees who work without a labor contract can be discharged by the employer at any time (for any reason or for no reason at all) and that the employee is free to terminate the relationship at any time and for any reason. Until recently, the courts have consistently defended this doctrine except where civil rights statutes protecting minority workers have been involved and also where discharge may be construed as an attempt to prevent union organization, thus qualifying as an unfair labor practice under the National Labor Relations Act or the Labor Management Relations Act. Courts recently, however, have begun to borrow an insurance law concept in which all contracts, whether written, verbal, or implied, imply principles of good faith and fair dealing. Still in a state of infancy, this application is yet to be generalized as a legal axiom in employment law and has yet to be applied by a Texas court.

The National Experience

Over the last few years, courts in various states have defined several additional exceptions to the terminable-at-will standard that move toward the traditional union contract principle of dismissal for just cause only.

Perhaps the oldest and best established exception is the public policy exception, wherein it is argued that at-will termination of employees may run counter to public policy. Initially this argument was developed in a 1959 California case, *Petermann v. International Brotherhood of Teamsters*. Petermann, a full-time employee with an indefinite term of employment, was discharged, he alleged, because he refused to lie during a hearing by the state legislature that was investigating his employer (the union). The court held that the right to discharge an employee who was employed for an indefinite period was limited by considera-

tions of public policy.¹ The court concluded that the public good had been threatened by the employer's penalty assessed to Petermann for refusing to break the law and perjure himself.

In a more recent Indiana case, *Frampton v. Central Indiana Gas Company* (1973), an employee maintained she had been discharged for pursuing a workmen's compensation claim. The court held that she could sue her employer for wrongful discharge and that this action by the employer was counter to public policy.²

The public policy argument was broadened considerably in 1979 by the New Hampshire Supreme Court in the *Monge v. Beebe Rubber Company* case. In this case the public policy constraint seemed to include a test of good faith and fair dealing. The court upheld an award of \$1,000 for Olga Monge as a result of her claims that she was fired for refusing to go on a date with her foreman. The decision held that the employer's interest in running a business must be balanced against both the employee's interest in employment and the public's interest in the balance between the two. The court held that termination could not be motivated by bad faith, malice, or retaliation.³ The logic of this decision begins to establish a legal concept limiting at-will discharges to the common union contract and civil service rule of discharge only for just cause. In *Fortune v. National Cash Register Co.*, the Massachusetts Supreme Court upheld a decision in favor of an employee who maintained that the employer had fired him to avoid paying earned commissions. The decision suggested there is an "implied covenant of good faith and fair dealing" in the employer-employee relationship.⁴

An additional development emerged in a Washington Superior Court case, *Vorhees v. Shriner's Hospital for Crippled Children*. The court held that the hospital's employee manual implied a policy of dismissal only for just cause, though the employee was not on contract. The issue at hand was the dismissal of a nurse after a "playful water fight" with a young patient. The court held that the nurse's behavior was not just cause for dismissal and awarded reinstatement and back wages.⁵

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The public policy exception is likely to have a powerful, but infrequent, effect on employers' termination decisions. Such situations as those in the *Petermann* case or the *Frampton* case do not occur every day and require specific impediments to public policy. The good faith and fair dealing exception, as developed in the *Monge*, *Fortune*, and *Vorhees* cases, could be a greater problem for employers because it is more vague and involves more subjectivity than does the public policy exception. The probability of frequent litigation seems high, especially as it becomes more widely known that courts and juries have reviewed the fairness of employers' termination decisions. While these two exceptions have affected employers' traditional exercise of the terminable-at-will concept in several states, Texas law and the Texas courts have been slow to follow suit.

The Texas Situation

Unless a contract states otherwise, a Texas employer has the right to terminate an employee with or without reason. A series of Texas cases has established that the discharge of an employee requires no justification unless the employer's right to discharge an employee is limited by contract, that under these circumstances it is immaterial whatever the employer's motive in the termination might have been, and that when an employer is dissatisfied enough to fire an employee only the employer can determine the dissatisfaction.⁶

Consequently, in Texas, dismissal requires no justification unless the employer's right to terminate is limited by contract. Where employees are protected by contracts that allow discharge for nonperformance, a Texas employer is the judge as to whether termination is justified. While these principles have been challenged in Texas recently, the Texas courts have not yet chosen to follow the lead of courts in other states and limit the terminable-at-will doctrine through common law.

A direct test of the public policy concept in Texas appeared in *Phillips v. Goodyear Tire and Rubber Company*, in which Phillips claimed Goodyear had terminated his employment in retaliation for truthful testimony, which was adverse to the employer, given in a federal trial. Though the District Court awarded Phillips \$400,000 damages, the Court of Civil Appeals reversed the decision. Judge Jerre S. Williams held that under Texas law when an employee is hired for an indefinite period, employment may be terminated at will by either party and that the employer may, without liability, discharge an employee for good reason, bad reason, or no reason at all. He also held that though strong public policy favors protecting those who fulfill their duty to testify truthfully in court proceedings, the Court of Civil Appeals could find no indication in the law of Texas that would recognize a public policy exception. Phillips argued not only that perjuring one's self would be generally in violation of public policy, but also that the employer's acts of retaliation were specifically prohibited by statutes that impose criminal penalties on

those who attempt to intimidate witnesses or to retaliate against those who have been witnesses. Though the employer was apparently in violation of the criminal law and the employer's actions contrary to public policy, Judge Williams held that "though the employer could perhaps be prosecuted, the act of discharge itself was not preventable by law."⁷

In *Watson v. Zep Manufacturing Company*, the Court of Civil Appeals dealt directly with the good faith and fair dealing concept. Watson contended that there was an implied agreement not to discharge him without just cause and that the common law of Texas had evolved to a point that the employer has a legal obligation not to discharge without just cause. In analyzing the assertion that there was an implied agreement not to discharge him without just cause, the court noted that there was only an oral agreement to employ Watson at an hourly wage and that no employment period was specified. Watson claimed he was offered a "steady job" and that he was promised, and received, a raise in pay after three months. This agreement constituted an employment contract according to Watson.

The court noted that the oral agreement did not constitute an implied agreement but was consistent with employment that is terminable at the will of either party and found that there was no implied agreement not to discharge without cause. In his opinion, Justice C. J. Guittard further noted that the forum for resolving the question of whether or not dismissal for just cause was allowed in Texas common law was not the court system but rather the legislature. "In the long run," he stated, "the popular will, as expressed in legislation, may be a more reliable means to social progress than the employment of the adversary process of an already overloaded judicial system as a remedy for every social ill."⁸ Oral and implied employment contracts have been offered as constraints on the terminable-at-will doctrine in Texas in several other cases but, in recent years, have consistently been cast aside by the courts.⁹

A very recent test of the terminable-at-will tradition in Texas is *Maus v. National Living Centers, Inc.* Maus, a nurses' aide at a nursing home, chronically complained to her superiors that patients were neglected and received inadequate care. A patient under Maus's care suffered a stroke and the director of nurses refused to call a doctor. Maus administered cardiopulmonary resuscitation (CPR) and kept the patient alive for several days, but the patient died. Maus was then fired in alleged retaliation for her complaints about patient care. There was no employment contract and no dispute that Maus was an at-will employee, but Maus sued National Living Centers for illegal termination and argued that public policy was violated. The trial court entered summary judgment for National Living Centers and noted that Texas has yet to recognize an exception for retaliatory motives to the traditional terminable-at-will doctrine.¹⁰ The trial court decision suggests that modifications in the terminable-at-will doctrine in Texas should be the responsibility of the legislature or the state supreme court. Nursing homes do have a statutory duty to report cases of abuse and neglect and failure to do so is a criminal

offense, but the legislature has not yet created cause of action for those fired in retaliation for their efforts to report abuses.

The legal opinions in both the *Watson* and *Maus* cases certainly disclaim a role for the courts in imposing a standard of fairness and good faith in employee discharges. To date, the common law in Texas does not constrain the application of the terminable-at-will doctrine in terms of fairness or good faith. Although legislation retiring the terminable-at-will doctrine could always be introduced, so far no serious initiatives have been generated in Texas. Organized labor is not likely to lead such a movement, since labor contracts secured through negotiations are the easiest and most direct method to limit the employer's discharge powers. Nonunion employees are extremely diverse and without organization and are, therefore, unlikely to lobby successfully for a legislative relaxation of the terminable-at-will concept. For the present, the terminable-at-will doctrine will apparently remain in the personnel administration practices of Texas employers.

Implications for Texas Employers

Texas employers, though protected by the courts, can no doubt expect increased agitation and litigation from noncontract employees with indefinite terms of employment when they believe they have been dismissed for something less than just cause. The *Watson*, *Phillips*, and *Maus* cases show that perceived unfairness or public policy violations can and have led to litigation in Texas. Thus far, state law upholds the terminable-at-will doctrine, state courts have been cautious in limiting it, and no Texas employee has won a reversal of a discharge. Yet the growing number of legal decisions from other states that have relaxed the concept will have an increasing effect on the expectations of Texas workers. Texas employers need to be

aware of the erosion of the terminable-at-will concept nationally and of the popular press this trend has and will likely receive. Prudent employers will want to approach the discharge of terminable-at-will employees cautiously if public policy questions or substantial questions of fairness and equity could be raised. At this point, in Texas, whimsical, capricious discharges of at-will employees present an increasing risk of litigation and are ill-advised.

Notes

1. *Petermann v. International Brotherhood of Teamsters*, 344P. 2d 25 (Cal. App., 1959), 27.
2. *Frampton v. Central Indiana Gas Co.*, 297 NE 2d 425 (Ind., 1973).
3. *Monge v. Beebe Rubber Co.*, 316 A. 2d 549 (N.H., 1974), 551-52.
4. *Fortune v. National Cash Register Co.*, 364 NE 2d 1251 (Mass., 1977).
5. *Vorhees v. Shriner's Hospital for Crippled Children*, as summarized in "The Growing Costs of Firing Non-Union Workers," *Business Week*, April 6, 1981, pp. 95-96.
6. *St. Louis Southwestern Railway Co. v. Griffin*, 106 Tex. 477, 171 SW 2d 703 (1914); *United Services Auto Association v. Tull*, 571 SW 2d 551 (Tex. CA-San Antonio, 1978); *Cactus Feeders, Inc. v. Wittler*, 509 SW 2d 934 (Tex. CA-Amarillo, 1974); *Perdue v. J.C. Penney Co.*, 470 F. Supp. 1234 (SD N.Y., 1979); *Bowen v. Wohl Shoe Co.*, 389 F. Supp. 572 (SD Tex., 1975); *Lone Star Cotton Mills, Inc. v. Thomas* 227 SW 2d 300 CA; and *Watkins & Thurman v. Napier*, 98 SW 904 CA are the relevant cases.
7. *Phillips v. Goodyear Tire and Rubber Co.*, 651 F. 2d 1051 (1981).
8. *Watson v. Zep Manufacturing Co.*, 582 SW 2d 178 (Tex. Civ. App., 1979).
9. *Cox v. Bell Helicopter*, 425 F. Supp. 99 (1977); *Bowen v. Wohl Shoe Co.*, 389 F. Supp. 572 (1975); and *United Services Auto Assn. v. Tull*, 571 SW 2d 551 (Tex. Civ. App., 1978).
10. *Maus v. National Living Centers, Inc.*, _____ SW 2d _____ (Tex. CA-Austin) cause no. 13,459, delivered May 12, 1982.

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Groundwater Depletion and Regional Agriculture

Alternative Projections

Jean O. Williams

Harvey Banks

The High Plains study region extends over parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, and Texas. Much of this region is underlain by the Ogallala, a major aquifer supplying most of the water needs of the area's extensive agricultural base (see figure). Currently, the region provides about 20 percent of total national irrigated acreage and is known particularly for its production of feed grain crops, primarily corn and grain sorghum.

Because of the projected depletion of groundwater supplies, more than 5 million acres will go out of irrigation between now and the year 2020. Long-term projections, however, indicate that the regional economy will not suffer as much as might be expected. Ogallala water depletion will cause a major decline in the ability of New Mexico, Oklahoma, and Texas to produce feed grains, but these crops will be replaced by others with lesser water needs, such as cotton and wheat. Textile manufacturing will probably increase in this area as the feed-cattle industry grows steadily in Colorado, Kansas, and Nebraska.

Historical Perspective

This region once offered large quantities of good water, abundant low-cost energy, deep soils, level terrain, and a good agricultural climate. Irrigated agriculture, largely supplied by water from the Ogallala Aquifer, expanded rapidly following World War II. Total irrigated acreage in the six-state area expanded from about 3.5 million acres (mostly

in Texas and Nebraska) in 1950 to more than 15 million acres in 1980. As irrigated acreage increased, water requirements grew. Less than 7 million acre-feet of water were withdrawn from the Ogallala in 1950. By 1980, more than 21 million acre-feet were pumped out annually even though over the same period improved irrigation efficiencies had reduced the application of water by about 30 percent from 2.0 acre-feet for each acre to about 1.4 acre-feet.

As feed grain production in the six states grew from 150 million bushels in 1950 to 1.25 billion bushels in 1980, a complex infrastructure of agricultural business supply, including fertilizers, farm equipment, and capital investments, developed. Oil and gas reserves also became important to the regional economy, although over the long term these reserves will be seriously depleted.

Alternative Management Strategies

To examine the effects of the depletion of water resources on agriculture in the High Plains states, the High Plains study developed two management strategies involving reduced water demands in the region and three management strategies involving increased water supplies. These strategies were then compared to a projected baseline that continued present trends in water use with no new public water policies or programs; this baseline assumption was based on data for 1977.

The Five Strategies

The first strategy was designed to stimulate voluntary action to reduce water demands through research, education, demonstration programs, and incentives, using technology and practices either not considered in the baseline

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or reflected at rates that would be purposefully accelerated. The second strategy assumed strategy 1 policies and programs and, in addition, projected further water demand reduction by mandatory water-use reduction programs. In the third strategy such local practices as cloud seeding, storage of water, groundwater recharge, desalination, and snowpack and vegetation management were assumed to be practiced in order to augment efforts to reduce demand. Strategy 4 involved exchanging surface water supplies within individual states in the High Plains, while the fifth strategy involved importing water from areas adjacent to the Ogallala region through large-scale federal projects or joint federal and state projects to restore and maintain irrigation of the acreage that would otherwise have reverted to dryland farming by the year 2020 under the first two strategies.

For each strategy, models projected crop production, irrigated and dryland crop acreages, value of agricultural production, returns to land and management (plus returns to imported water for the fifth strategy), and groundwater use for 1985, 1990, 2000, and 2020. State and regional

input-output models then projected industrial activities, employment, total value added, total household income, and state and local tax revenues, each related to the projections for the future years. The input-output models divided the High Plains into northern (Nebraska, Kansas, and Colorado) and southern (Oklahoma, New Mexico, and Texas) subregions to highlight future probable differences. Projections of energy production, economic effects, and prices were incorporated. When the five strategies were compared, the third had to be omitted because water augmentation programs at the local level were impossible to quantify and the fourth was quantified only for Nebraska and Oklahoma. The fifth strategy was broken down into two variations: strategy 5-A projected water importation tied to the water use reduction programs of the first strategy and strategy 5-B was tied to the programs of the second strategy.

In addition, the study assumed that the decline in crude oil and marketed natural gas production would continue to 2020. By 2020, these production levels are projected to be approximately one-tenth of the 1977 levels. Electricity, however, is projected to increase in both production and installed generating capacity by approximately threefold. Some increase is projected in the consumption of water that accompanies energy production.

Long-term projections of events and conditions, such as those in this study, are never certain; the longer the term, the wider the margin of probable error in projections. This warning is particularly true for variables influencing and influenced by agricultural production, where the vagaries of weather, plant disease, insects, and the farm managers' skills add to uncertainties of production costs, demands, prices, and research.

Subregional Comparisons

Aquifer thickness generally increases from south to north. In addition, much of the southern High Plains has been using irrigation longer than the northern subregion has. By the base year 1977, New Mexico, Oklahoma, and Texas had only 12 percent of the Ogallala water in storage for the entire region. Under baseline 1977 conditions, the southern Ogallala subregion has about 48 percent of the irrigated acres in the region but only about 36 percent of the dryland acreage (see table 1). This disparity in acreage is reflected in lower value for agricultural production and lower returns to land and management from agricultural sales. In contrast, the southern subregion enjoys a relative advantage over the northern in the key regional economic indicators because of a more vigorous and diversified nonagricultural economy in 1977, particularly in the energy sector. Total value added by all sectors in the southern sub-

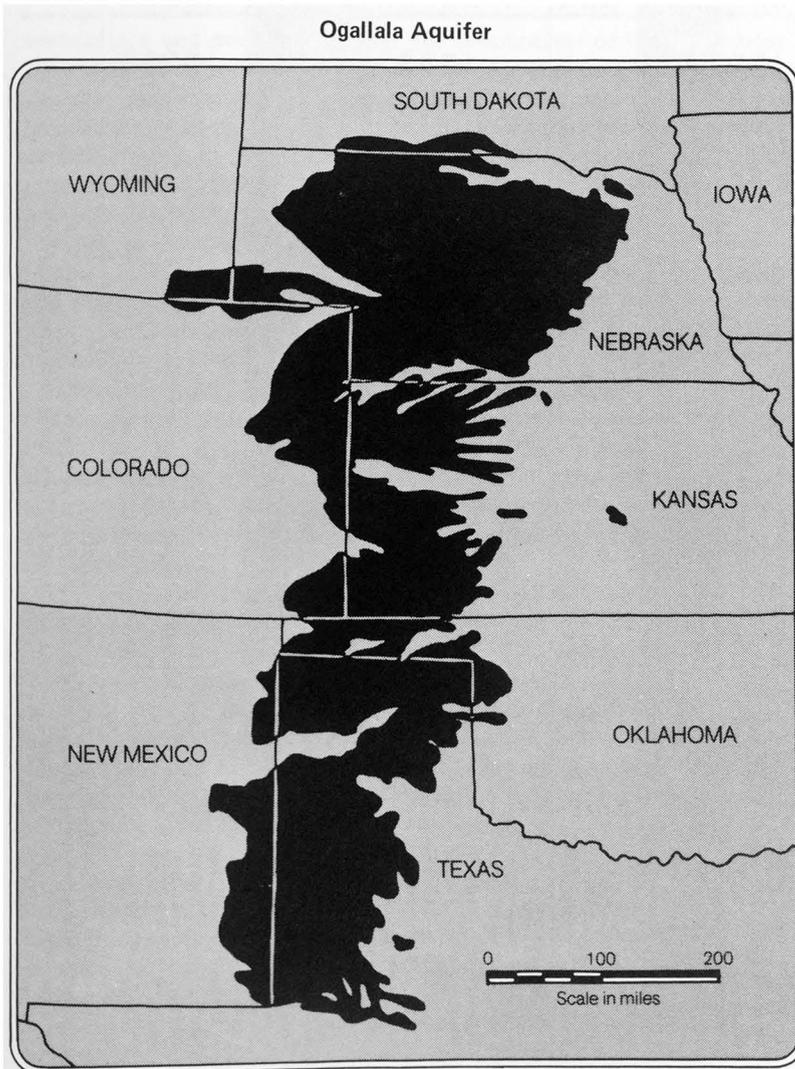


Table 1

Key Economic Indicators under Various Management Strategies for the High Plains Region

Area Strategy	Irrigated acres		Dryland acres		Total value of agricultural product*		Returns to land and management		Water remaining in storage		Total value added for all sectors†		Employment‡	
	In thousands	Percentage change from baseline	In thousands	Percentage change from baseline	Millions of 1977 dollars	Percentage change from baseline	Millions of 1977 dollars	Percentage change from baseline	Millions of acre- feet	Percentage change from baseline	Millions of 1977 dollars	Percentage change from baseline	In thousands	Percentage change from baseline
1977 (base year)														
North Baseline	7,480	—	11,595	—	2,610	—	850	—	2,659.4	—	7,047	—	444.2	—
South Baseline	6,805	—	6,675	—	1,960	—	200	—	367.4	—	14,406	—	563.6	—
Region Baseline	14,285	—	18,270	—	4,570	—	1,050	—	3,026.8	—	21,453	—	1,007.8	—
1990														
North Baseline	9,480	—	11,605	—	4,640	—	1,775	—	2,501.2	—	11,957	—	533	—
Strategy 1	9,710	2.4	11,575	-0.3	4,710	1.5	1,805	1.7	2,508.3	0.3	12,028	0.6	537	0.7
Strategy 2	9,420	-0.6	11,820	1.9	4,425	-4.6	1,730	-2.5	2,516.3	0.6	11,699	-2.2	521	-2.4
South Baseline	6,355	—	7,105	—	2,770	—	530	—	266.8	—	26,643	—	703	—
Strategy 1	6,400	0.7	7,070	-0.5	2,785	0.5	531	0.0	272.0	2.0	26,662	0.1	704	0.2
Strategy 2	5,635	-11.4	7,765	9.3	2,565	-7.4	495	-6.6	273.6	2.5	26,514	-0.5	696	-1.1
Region Baseline	15,835	—	18,710	—	7,410	—	2,305	—	2,768.0	—	38,600	—	1,237	—
Strategy 1	16,110	1.7	18,645	-0.3	7,495	1.1	2,335	1.3	2,780.3	0.5	38,690	0.2	1,241	0.4
Strategy 2	15,055	-4.9	19,585	4.7	6,990	-5.7	2,225	-3.5	2,789.9	0.8	38,212	-1.0	1,216	-1.6
2020														
North Baseline	12,410	—	11,825	—	8,110	—	3,990	—	2,177.9	—	19,636	—	555	—
Strategy 1	13,305	7.2	11,710	-1.0	8,475	4.5	4,035	1.1	2,161.1	-0.8	20,048	2.1	568	2.4
Strategy 2	13,280	7.0	11,410	-3.5	7,550	-7.0	3,670	-8.0	2,264.3	4.0	18,855	-4.0	531	-4.3
Strategy 5-A	16,280	31.2	9,845	-16.7	9,385	15.7	4,540‡	13.8	2,161.1	-0.8	21,162	7.8	604	8.9
Strategy 5-B	15,475	24.7	10,265	-13.2	8,375	3.3	4,070‡	2.0	2,264.3	4.0	19,787	0.8	563	1.5
South Baseline	5,635	—	7,725	—	3,385	—	920	—	125.7	—	29,540	—	778	—
Strategy 1	5,685	0.9	7,685	-0.5	3,400	0.4	955	3.8	139.4	10.9	29,577	0.1	780	0.2
Strategy 2	4,755	-15.6	8,520	10.3	3,035	-10.3	880	-4.3	163.0	29.7	29,270	-0.9	770	-1.1
Strategy 5-A	7,320	29.9	6,160	-20.3	3,815	12.7	1,100‡	19.6	139.4	10.9	30,011	1.6	793	1.8
Strategy 5-B	6,020	6.8	7,350	-4.9	3,335	-1.5	1,020‡	10.9	163.0	29.7	29,609	0.2	780	0.2
Region Baseline	18,045	—	19,550	—	11,495	—	4,910	—	2,303.6	—	49,176	—	1,333	—
Strategy 1	18,990	5.2	19,393	-0.8	11,875	3.3	4,985	1.5	2,300.5	-0.1	49,625	0.9	1,347	1.1
Strategy 2	18,035	-0.1	19,930	1.9	10,585	-7.9	4,550	-7.3	2,427.3	5.4	48,125	-2.1	1,301	-2.4
Strategy 5-A	23,600	30.7	16,005	-18.1	13,200	14.8	5,640‡	14.9	2,300.5	-0.1	51,173	4.1	1,397	4.8
Strategy 5-B	21,495	19.1	17,615	-9.9	11,710	1.9	5,090‡	3.7	2,427.3	5.4	49,396	0.5	1,343	0.7

*Includes value from dryland and irrigated crop production.

†Includes energy and other sectors in addition to agricultural sectors.

‡Includes returns to imported water; no costs are charged to farm budgets for imported water.

region is more than double that of the northern. Employment in the southern subregion constitutes about 56 percent of total regional employment.

By 1990, the differences between the southern Ogallala states and the northern subregion should be even more pronounced in the agricultural sector. Under the most favorable strategy for reduction in water use (the second strategy), the percentage of stored water that is in the southern subregion will still decline from 12 percent to 10 percent in 1990. The percentage of total irrigated acreage in New Mexico, Oklahoma, and Texas will fall from 48 percent in 1977 to only 40 percent in 1990 under baseline

crop cotton economy in Texas will replace sorghums, while Nebraska corn will dominate all crop production in the northern subregion under baseline projections. Wheat would remain important in all states except New Mexico, while the feed grains, primarily corn and sorghums, would account for over 55 percent of regional production value.

Generally, projections for the several strategies do not indicate a marked change in the current mix of crops and the relative sizes of their volume of production to 2020. Corn (almost all in Nebraska) and cotton (almost all in Texas) increase in the years ahead but only slightly at the expense of other crops. Also, the strategies would not cause

*By 2020, the southern High Plains states
are projected to have only 5 percent to 7 percent
of the remaining Ogallala water in storage.*

assumptions and even more under the assumptions of the two water use reduction strategies: under the second strategy, for example, the percentage of total regional irrigated acres in the three southern states is projected to decline 11 percent in acreage in comparison to the baseline projections for 1990. Under the second strategy, the southern subregion also faces a 7.4 percent loss in total value of agricultural production and a 6.6 percent loss in returns to land and management in relation to 1990 baseline projections. Total value added in all sectors and employment projections show insignificant differences from the baseline projections for 1990.

The projections for 2020 indicate a further decline in stored groundwater from 1990 for the southern Ogallala states, for all strategies and the baseline. By 2020 the southern subregion is projected to have only 5.0 percent of the remaining Ogallala water in storage under baseline assumptions and 7.0 percent under the more favorable strategies 2 and 5-B.

Total irrigated acreage for the southern Ogallala is most favorable under strategy 5-A, at 7.32 million acres or about 30 percent above baseline projections for 2020, while it is least favorable under strategy 2, with only 4.75 million acres or almost 16 percent below baseline projections. Similarly, total value of agricultural production will go up about 13 percent and returns to land and management will increase almost 20 percent under strategy 5-A; corresponding negative effects will accompany strategy 2.

Crop Production. Corn, wheat, grain sorghums, and cotton (in order of 1977 value of production) are the crops best suited to irrigation in the High Plains. In 1977, these four, irrigated and dryland together, accounted for nearly 94 percent of all principal crop production value in the region (see table 2). By 2020, the baseline projections show cotton moving slightly ahead of grain sorghum. Virtually a one-

major shifts in the shares of each crop in national production. The water demand reduction strategies (the first two) cause the least deviation from the baseline projections, while the import strategies cause the most, raising the regional share of crops (such as corn) that use great amounts of water.

Environmental Quality. The High Plains is generally flat to gently rolling with vegetation typical of a place with moderate to low rainfall. Shallow river and tributary stream valleys crossing the Plains afford residual habitat for wild-

Table 2
National Dependence on High Plains Agricultural Production

Crop Year	Percentage of national production		
	Total	Irrigated	Dryland
Wheat			
1977	16.4	3.1	13.3
1985	13.4	1.6	11.8
1990	12.8	1.0	11.8
2000	11.9	0.7	11.2
2020	10.4	0.4	10.0
Corn			
1977	13.1	12.3	0.8
1985	13.1	12.7	0.4
1990	12.6	12.4	0.2
2000	13.2	13.1	0.1
2020	12.6	12.5	0.1
Sorghum			
1977	39.7	22.8	16.9
1985	36.8	20.0	16.8
1990	34.5	18.4	16.1
2000	33.4	18.5	14.9
2020	29.8	15.0	14.8
Cotton			
1977	24.9	16.5	2.4
1985	31.2	22.6	8.6
1990	33.8	25.1	8.7
2000	35.5	26.8	8.7
2020	31.9	23.0	8.9

life from intensively cropped fields and grasslands. River valleys and sand hills in the northern states and the playa lakes in the southern subregion provide habitat for waterfowl migrating to and from Canadian breeding grounds.

Environmental effects that are influenced by farming practices and aquifer depletion will occur under the baseline conditions, but the rate of change would be altered to differing degrees by the different strategies. Generally, dryland farming and farm abandonments result in greater soil losses than irrigated agriculture does. Streams could be reduced in flow and groundwater could become more difficult to reach. Where the flow of streams is reduced, aquatic habitat, potable supplies, diversions for agriculture, and reservoir supplies are all negatively affected. Stream flows will be reduced to some extent regardless of the strategy considered.

Lessened stream flows will directly reduce aquatic habitat and associated species and will degrade the habitat for such related species as waterfowl, wading birds, and shorebirds. New species may enter the region and affect species that now live there. Aquatic habitat and fisheries in lakes and reservoirs may be affected by the depletion of feeder streams. Modification of playa lakes and drainage of other wetlands may result in a scarcity of water with adverse effects on wildlife resources.

Land use changes will negatively affect aquatic species, in part because of loss of tailwater from improved irrigation, and will more positively affect terrestrial species. Dryland farming and rangeland are less intensively used, and, in general, provide better wildlife habitat than irrigated land. Rangeland or native grasses provide excellent natural habitat, but a conservation program would have to reseed abandoned acreages. Irrigation may cause silting and draining of valuable wetlands and loss of cover and terrestrial habitat. The major adverse effect from improved dryland farming would be the development of marginal lands in areas with, or near, surface water.

Points downstream from water sites to be used in transfer programs would be affected under the strategies that would use water transfers. Reduced downstream discharges could change the morphology of stream channels and could adversely affect aquatic species and productivity, riparian wildlife habitat, water quality, sediment transport, minimum flows needed to control the salinity of the Mississippi River delta, and fresh water needed for coastal fisheries in Louisiana.

Economic and Legal Aspects. Between 1985 and 2020 under the baseline situation, the percentage of per capita disposable income spent on food is projected to decline from 17.5 percent to 17.1 percent. During the same period, the value of major agricultural exports would more than double from under \$21 billion to slightly over \$51 billion (in 1977 dollars). Farm prices are projected to increase at an average annual real rate of about 0.6 percent. Consumer expenditures on food, thus, would increase by \$40 to \$50 a person.

The High Plains region is projected to produce a declining proportion of national output for several crops under

the baseline conditions. For example, wheat produced in the High Plains would fall from 16.4 percent of the national total in 1977 to 10.4 percent in 2020.

Under the first strategy, crop production changes so little that crop price changes were not projected. With the cutback in water use under strategy 2, regional production is reduced and national crop prices rise. A rough estimate suggests that consumer payments for food will increase about \$1 for each person annually at the farm level (perhaps by as much as \$2.60 when markups are added). The net increase by 2020 thus ranges from \$290 million at farm level to \$750 million after markups. The volume of exports will fall because of higher prices and reduced production; grain and oilseed exports will be down 1.4 percent and cotton 1.7 percent in 2020. Total value of exports will fall about 0.7 percent in 2020 for a foreign exchange loss of some \$365 million on those crops that are staples in the High Plains.

The rising production that would accompany water imports under strategy 5-A is projected to have a limited but positive value for consumers. At the farm level, consumer expenditures for food and fiber should fall about \$2 a person by 2020 because of price decreases associated with increased national production. Increased production and lowered prices expand the volume of exports. In 2020, grain exports rise nearly 100 million bushels (1.0 percent) over baseline conditions and cotton exports rise 0.5 million bales (4.3 percent). The decreased price for all exports, however, actually lowers the net value of agricultural exports in 2020 by \$100 million under strategy 5-A.

The alternative water management strategies will require statutes and institutions to make implementation possible. For example, each of the streams considered for water transfer under the fifth strategy runs through more than one state. Federal projects on each stream serve specific purposes: irrigation, municipal and industrial uses, flood control, hydropower, navigation, recreation, and other in-stream uses. Water diversion to the High Plains could impair existing and future uses downstream from the diversion point and, in contrast, future uses upstream of the point of diversion could decrease the amount of water available for transfer. Once a definite plan is formulated, waters of the interstate streams would have to be apportioned either through congressional action or through an interstate or federal-interstate compact.

Transition to Dryland Farming

Surveys in nine Texas South Plains counties and in four southwestern Kansas counties assessed conditions that might be encountered in a transition from the presently mixed irrigation and dryland agricultural economy to a dryland economy. Conditions before the beginning of substantial irrigation development in 1945, trends from 1946 through 1981, and projected conditions in these two areas as water becomes scarcer and more costly were analyzed.

Three probable sets of consequences could be projected as parts of the transition to dryland farming. First, if the

farmer, agricultural-business, and related economic interests were forced to operate in a nearly dryland farming economy during the next three to five years with stable land prices, high mortgages, rising energy and other production costs, and today's crop prices, resulting economic and social readjustments could be devastating for some. Second, if crop prices and yield relations of 1975 to 1980 were to hold for the next forty years, while projected rates of groundwater depletion continued, gross income could decline by 25 percent to 50 percent, depending on area, over an extended time span. This decline could be offset by the lower production costs involved in dryland farming when compared to irrigated farming. Third, if crop prices and yields increase more than farm costs, as projected in the analyses used for this study, while rates of water depletion continue, the transition would occur within a long-term agricultural setting that could cushion severe local economic and social disruptions.

Cost Comparisons

Effective water demand and supply management programs cannot be achieved without substantial investment in improved water management capabilities. The alternative water resource management strategies are a continuum of potential reductions in water demand or increases in water supply for agricultural uses in the region over time, with an accompanying increase in implementation costs. These costs vary under the different strategies.

Many effective agricultural water management practices have already been implemented extensively, although at varying rates and levels among the states, and these are projected to expand under the baseline assumptions. Several agricultural water management improvements are presently eligible for cost-sharing assistance or extension, demonstration, and technical assistance from existing public programs. Expenditures by U.S. Department of Agriculture programs in 1978 amount to about \$120 million a year, a federal investment of about \$3.50 an irrigated acre. A matching private investment of about four to one, or \$14 an acre annually (a typical rate from previous years), projects a total annual investment of about \$17.50 an acre in agricultural water management improvements. Under baseline assumptions, this \$17.50 an acre would indicate a total regional cost of about \$280 million in 1985, increasing to about \$315 million by 2020. The increase would largely result from projected increases in total irrigated acres.

The principal difference between baseline projections and projections from the first strategy is the assumption of expanded and accelerated voluntary adoption of improved agricultural water management practices and technologies because of new incentives. These changes would mainly occur in the public sector. New incentive programs will increase costs for each acre by about 10 percent over the baseline to an average of \$3.85 an acre for public investment and \$15.40 an acre for private. In total regional cost, this strategy would add about \$35 million in 1985 and \$41 million in 2020 over projected baseline costs.

In the second strategy the added costs are primarily institutional costs required to administer a local and state regulatory program to implement the projected mandatory reductions in annual water use rates by individual irrigators. If the average annual costs of administering the requirements of this strategy are about \$50 a well, additional regional costs would be about \$6 million in 1985 and \$7 million by 2020. Initial equipment costs for well gauging and monitoring of pumping rates could be in the range of \$100 to \$150 a well, a total cost of about \$20 million.

Under the third strategy current levels of agricultural research in the High Plains (now about \$20 million to \$25 million annually) should increase by \$1 million to \$1.5 million each year until 1990, for an initial cost of \$9 million to \$12 million. Priority for funding for the various technologies would be at the discretion of the states.

Under strategies 4 and 5, a cost of \$90 million is required for the increase of 4.6 million irrigated acres by 2020. An additional cost associated with the water transfer alternatives relates to water distribution from terminal reservoirs to the farm headgates at about \$2,150 for each irrigated acre. For the 4.6 million acres that are projected to go out of irrigated production by 2020 under the assumptions of the first strategy, the total capital costs for the necessary distribution systems could amount to \$9.9 billion.

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Recent Developments in the Consumer Price Index Controversy

Bryan Richey

Over the years, price statistics, particularly the Consumer Price Index (CPI), have grown in popularity, and the number and variety of uses of this measure have expanded dramatically. In addressing issues associated with the CPI, Janet L. Norwood, commissioner of the Bureau of Labor Statistics (BLS), recently pointed out that although the index serves users during periods of rising and declining prices as well as relative price stability, questions about the reliability and accuracy of the measure always seem to mount during periods of rising prices. As part of its continuing effort to improve and maintain the accuracy of the index, the BLS recently revised one of its major components—the one measuring homeownership. In order to use the index well, however, users must understand what the CPI is intended to measure, how it is constructed, and which areas need to be improved.

The Bureau of Labor Statistics and the Consumer Price Index

For nearly one hundred years, the BLS has collected, processed, analyzed, and disseminated much of the nation's most important economic information. Prices and living conditions, wages and industrial relations, productivity and technology, employment and unemployment, hours and earnings, and occupational safety and health represent the bureau's principal statistical programs. At present, there are eight regional offices serving the United States.

Aside from their primary data collection activities and technical support rendered to cooperating state agencies,

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the regional offices prepare, analyze, and release publications covering the full range of BLS programs and provide consultative services, working directly with users in explaining definitions, concepts, and methodologies and in interpreting bureau statistics. Aside from national data, among the most popular reports released by the bureau's Southwest Regional Office headquartered in Dallas are the consumer price reports for the Dallas-Fort Worth and Houston standard metropolitan statistical areas (SMSAs) (see tables 1, 2, and 3), occupational wages and fringe benefits for selected SMSAs in the Southwest, and the labor force reports (employment, unemployment, hours, and earnings) for the Southwest.

The bureau first produced and began using a CPI during World War I to set new wage levels for workers in ship-building centers. It was first published in 1919 and since then has undergone conceptual and technical changes, including five major revisions, to keep pace with the growing number of uses and users of these data. When the last major revision was made in 1978, a new index—the Consumer Price Index for All Urban Consumers (CPI-U)—was initiated. A more comprehensive measure than the traditional Wage Earner/Clerical Worker Index (CPI-W), the CPI-U covers approximately 80 percent of the nation's total population—nearly twice the coverage of the CPI-W.

Technically the CPI measures price changes for consumption at the retail level and is based on a fixed market basket of goods and services covering virtually everything people buy—food, clothing, housing, transportation, medical care, entertainment, and consumer services. The CPI has never been limited to the necessities, however that term may be defined. It is an aggregate measure and as such may not correspond to the experience of any individual or family with respect to price changes, but when all of the

individuals and families and their experiences are averaged together, the CPI does a very dependable job.

The CPI is a good measure of the changes in purchasing power of the average family represented in the index. In a period of rising prices, it tells us how much more income is required to purchase the same goods and services in the same quantities as those purchased in some previous period. The fact that the CPI-U in August 1982 was 292.8 means that the same goods and services costing \$100 in 1967, the base year, cost \$292.80 in August.

While it is difficult to develop precise measures of the total effect of these uses, it is estimated that roughly half of the nation's population (including dependents) are directly affected by changes in the CPI. As an escalator in collective bargaining agreements, the CPI increases the earnings of some 9 million union workers throughout the nation. Moreover, there is the indirect effect of these adjustments on the wages of nonunion workers as they seek to achieve parity. The income payments for approximately 36 million retired and disabled social security beneficiaries, retired military personnel, and retired civil service employees are adjusted annually by increases in the CPI. Subsidies for meals served in public schools, benefiting more than 25

million youngsters, are linked to changes in the food component of the CPI. Private pension plans, all sorts of leasing agreements, rents, royalties, child support payments, and food stamps are tied to the CPI. Even eight states now adjust income taxes to the index. The Economic Recovery Act of 1981 requires use of the CPI-U for escalation of federal income tax brackets and the personal exemption amount. Indeed, the indexing provision of the law has been described as the heart of tax reform, because it is intended to eliminate bracket creep by netting out the effect of inflation. Viewed another way, based on real income, only after earnings rise can taxes be increased. The new law also requires announcement of new tax brackets, in December 1984, based on data from the two previous years. This new use for the CPI will ultimately affect total federal revenues since future treasury receipts will rise only as fast as the growth of real income.

CPI Issues

Two principal allegations have been leveled at the CPI by various critics: that the index overstates the cost of living because it is based on a fixed market basket of goods and services and that it overstates the rate of inflation because of its method of calculating owner-occupied housing costs.

Fixed Market Basket

Since the CPI market basket is fixed, the index does not immediately reflect consumers' changes in buying habits as relative prices change. In addition, the weights of the goods and services in the market basket are held constant from month to month and from year to year. Indeed, they are held constant until a major revision occurs, usually every ten to twelve years following decennial censuses. The market basket is held constant in order to fix the living standard it represents and to isolate price changes from other changes—such as technological changes, growth of multiworker families, and changes in energy costs—that affect living standards.

Consumers shift purchases in response to changes in relative prices, but it is not known whether such changes in consumption result in an average

Table 1

Consumer Price Index: U.S. Average, August 1982
(1967=100)

Category	All urban consumers (CPI-U)		Urban wage earners and clerical workers (CPI-W)	
	Index	Percentage change from August 1981	Index	Percentage change from August 1981
All items	292.8	5.9	292.4	5.8
Food and beverages	279.9	3.6	280.2	3.5
Food	287.4	3.6	287.5	3.5
Food at home	280.8	2.9	279.8	2.8
Cereals and bakery products	284.8	4.5	283.4	4.2
Meats, poultry, fish, eggs	265.4	3.8	265.1	3.8
Dairy products	247.5	1.5	246.8	1.2
Fruits and vegetables	291.4	1.9	286.7	1.5
Other foods at home	333.3	2.5	334.0	2.4
Food away from home	308.7	5.1	311.8	5.2
Alcoholic beverages	210.1	4.3	212.1	4.1
Housing	320.1	6.8	320.5	7.0
Shelter	344.2	6.9	346.5	7.1
Residential rent	226.0	7.5	225.5	7.4
Other rental costs	333.9	11.9	333.3	11.5
Homeownership	385.9	6.7	390.1	6.9
Fuel and other utilities	356.3	8.7	357.7	8.8
Fuels	454.0	8.2	453.8	8.4
Fuel oil, coal, and bottled gas	659.9	-2.2	662.7	-2.2
Gas (piped) and electricity	404.4	12.1	403.7	12.3
Household furnishings and operations	233.4	4.7	230.0	4.6
Apparel and upkeep	191.8	2.3	190.7	1.5
Apparel commodities	180.8	1.6	180.3	0.7
Men's and boys' apparel	183.7	3.4	183.5	2.9
Women's and girls' apparel	159.2	0.9	160.9	-0.2
Infants' and toddlers' apparel	272.4	3.3	283.0	1.3
Footwear	204.4	2.2	204.1	1.6
Transportation	296.2	4.4	298.0	4.5
Private transportation	292.4	4.2	295.2	4.5
Public transportation	348.1	6.6	341.0	6.3
Medical care	333.3	11.4	331.3	11.0
Entertainment	237.4	6.8	233.9	6.4
Other goods and services	258.3	9.6	255.7	9.5
Personal care	250.6	6.6	248.8	7.1

Source: U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Prices* (Dallas: BLS, August 1982).

living standard that is higher or lower than that represented in the base period. If the market basket were changed whenever prices changed, with no knowledge of consumer satisfaction or the effect of consumption shifts on living standards, it would be unclear whether a change in the index was caused by price changes or by changes in the market basket.

The CPI is not a true measure of the cost of living, although it is frequently used for that purpose. Too many expenditures are excluded from the CPI that would be included in a true cost-of-living index; for example, both income taxes and social security taxes are left out of the CPI. Personal property taxes are also omitted, but real property taxes are counted. Similarly, life insurance premiums, investments in stocks and bonds, fringe benefits (health insurance, vacations, pensions), and government subsidies (museums, parks, zoos, transportation) are not included in the CPI.

A fixed-weight index like the CPI produces an upward bias because it does not allow for substitution. Generally, the size of the substitution bias is determined by the degree of price change and by the degree of substitution: the

greater the price change, the greater the substitution bias. A growing literature on this issue, however, indicates that the substitution bias is not significant over ten-year periods and longer, even in such volatile series as food.¹ In March 1980 Steven D. Braithwait showed that the substitution bias in the fixed-weight index over the fifteen years from 1958 to 1973 was 1.5 index points, or 0.1 index points a year. If Braithwait's findings are applied to 1980-1981, when the national inflation rate was more than 12 percent, the substitution bias for the period would be closer to 0.3 index points a year—a bias perhaps small enough to be ignored as a practical matter during periods of double-digit inflation.

Owner-Occupied Housing

The CPI does not assume, as some critics have alleged, that everyone in the sample buys a new house every month when index items are repriced. On average, homeownership accounts for about 25 percent of the expenditures covered by the CPI. In the current index, there are five monthly expenditures associated with owning a home: house price, interest cost, property tax, insurance, and maintenance and repair. The weights for the last three items are based on the average expenditures of all people living in their own homes during the base period, in this case 1972-1974, when the Bureau of Labor Statistics completed a series of national household surveys to determine incomes, expenditures, and family characteristics. Homeownership costs, then, for those who purchased homes before the base period are represented in the index only by price changes for tax, insurance, and maintenance and repair. This group, roughly 94 percent of the households surveyed, is assumed to have no house purchase price and no interest cost at all in the index. The weights for the other two items, house price and interest cost, are based on the average experience of the relatively small number of families, about 6 percent in all, who actually purchased a home in the base period. The average net change of houses bought and sold was used to determine weights for the house price and interest cost variables.

The bureau proposed a change in the treatment of homeownership costs before the last major

Table 2

Consumer Price Index: Dallas-Fort Worth, August 1982
(1967=100)

Category	All urban consumers (CPI-U)		Urban wage earners and clerical workers (CPI-W)	
	Index	Percentage change from August 1981	Index	Percentage change from August 1981
All items	304.3	5.6	300.2	5.3
Food and beverages	286.4	4.0	289.0	3.3
Food	290.9	3.9	294.7	3.1
Food at home	281.3	4.6	283.6	3.3
Cereals and bakery products	281.3	4.0	272.0	0.4
Meats, poultry, fish, eggs	262.2	5.2	266.4	6.6
Dairy products	255.0	3.4	261.6	3.9
Fruits and vegetables	285.4	2.2	288.2	2.2
Other foods at home	329.7	6.0	333.1	1.4
Food away from home	323.3	2.6	331.2	2.8
Alcoholic beverages	226.7	6.5	213.2	5.6
Housing	339.8	7.1	337.7	7.5
Shelter	380.1	6.8	380.7	7.2
Residential rent	230.5	8.7	230.5	8.7
Other rental costs	330.0	14.0	325.2	12.5
Homeownership	446.0	6.2	451.0	6.7
Fuel and other utilities	323.7	9.4	326.3	9.5
Fuels	441.4	9.7	443.7	9.7
Fuel oil, coal, and bottled gas*	178.4	1.0	178.1	0.8
Gas (piped) and electricity	441.9	10.1	444.7	10.2
Household furnishings and operations	237.9	6.0	231.2	6.9
Apparel and upkeep	197.7	- 1.8	189.2	- 2.3
Apparel commodities	177.1	- 4.0	170.2	- 3.3
Men's and boys' apparel	205.5	5.9	199.7	1.4
Women's and girls' apparel	144.5	-13.5	133.9	-10.1
Footwear	198.0	2.5	204.4	4.9
Transportation	297.9	2.7	298.3	1.8
Private transportation	296.6	2.4	297.8	1.7
Public transportation	332.3	9.7	317.4	n.a.
Medical care	326.2	10.7	320.1	10.5
Entertainment	232.4	6.6	218.4	6.6
Other goods and services	266.7	9.3	253.9	10.2
Personal care	267.1	8.5	257.0	10.1

*Based on June 1978=100.

Note: The Dallas-Fort Worth Consumer Price Index covers the counties of Collin, Dallas, Denton, Ellis, Hood, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise.

Source: See table 1.

Table 3
Consumer Price Index: Houston, August 1982
(1967=100)

Category	All urban consumers (CPI-U)		Urban wage earners and clerical workers (CPI-W)	
	Index	Percentage change from August 1981	Index	Percentage change from August 1981
All items	318.6	8.1	315.3	8.1
Food and beverages	308.9	4.8	303.9	5.1
Food	315.0	4.7	309.7	4.9
Food at home	292.4	3.1	291.7	3.7
Cereals and bakery products	274.4	3.4	272.2	3.8
Meats, poultry, fish, eggs	283.1	6.1	280.9	5.6
Dairy products	278.1	-1.2	270.8	-0.6
Fruits and vegetables	307.6	0.8	301.9	0.4
Other foods at home	321.9	2.9	331.7	5.3
Food away from home	387.3	8.2	368.0	7.8
Alcoholic beverages	246.4	6.6	246.1	8.2
Housing	364.5	11.2	360.3	11.2
Shelter	400.9	11.0	393.1	10.8
Residential rent	227.7	12.2	227.7	12.2
Other rental costs	297.7	13.1	294.8	13.0
Homeownership	471.1	10.6	466.2	10.3
Fuel and other utilities	452.6	18.9	454.8	19.1
Fuels	617.1	20.7	618.2	20.8
Fuel oil, coal, and bottled gas*	167.5	-0.2	167.5	-0.2
Gas (piped) and electricity	624.6	21.4	624.7	21.4
Household furnishings and operations	241.9	3.9	241.0	3.8
Apparel and upkeep	232.0	2.6	228.3	1.6
Apparel commodities	211.2	2.0	211.7	0.8
Men's and boys' apparel	221.1	8.4	223.6	9.6
Women's and girls' apparel	198.6	-4.5	199.6	-8.0
Footwear	229.5	4.0	231.0	2.0
Transportation	275.2	4.2	275.0	4.8
Private transportation	276.4	4.3	276.7	4.8
Public transportation	247.7	2.7	224.9	2.3
Medical care	370.5	14.0	385.8	14.3
Entertainment	243.7	9.2	233.3	9.8
Other goods and services	267.9	8.1	267.3	7.2
Personal care	299.3	8.8	302.7	8.0

*Based on June 1978=100.

Note: The Houston Consumer Price Index covers the counties of Brazoria, Ft. Bend, Harris, Liberty, Montgomery, and Waller.

Source: See table 1.

revision. The change, a user cost approach, would have reflected changes in the cost of consuming shelter provided by a house and at the same time would have corrected for the investment involved in ownership. In effect, the same five expenditures would have been used with adjustments for the interest cost of owning equity and the subtraction of appreciation. The bureau, however, could not get agreement from its business and labor research advisory councils.

Since January 1980, however, the bureau has published monthly estimates for five experimental indexes reflecting a different treatment of homeownership. All of the experimental measures exclude the asset value of owning a house, which is a principal criticism of the current technique, and each measure is assigned a lower weight than the current homeownership component.

Revising the Homeownership Component

After years of study and debate, the CPI homeownership component was changed to a rental equivalence. This change

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takes effect for the CPI-U in January 1983, but not until January 1985 for the CPI-W, in order to avoid affecting existing three-year labor contracts. Both research advisory councils supported the change. The new homeownership component will be linked to the existing CPI before the change so the historical series will not be broken.

The change reflects the fact that the thirty-year fixed-rate mortgage used in the present CPI is no longer the common approach to home financing. New types of mortgage instruments, characterized by variable rates, shorter financing terms, balloon payments, and a variety of other special arrangements, have emerged. Unfortunately, the CPI pricing techniques cannot efficiently capture the transaction in which a homeowner provides financing for the buyer. The bureau has also been unable to find a suitable cost-effective alternative for the Federal Housing Administration data base, which covers a relatively small and narrow segment of the housing market.

Most observers believe, based on past experience, that the rental equivalence measurement will result in a lower inflation rate in the CPI, but when the weight currently

assigned to homeownership is reduced the weights of other components (especially food, transportation, and energy) will automatically increase. Consequently, a sharp rise in the price of, say, imported oil, other factors being equal, would have a larger direct upward effect on a CPI using a rental equivalence than it would on the current measure.

The CPI is inevitably influenced by a variety of economic developments, including shifts in population, changes in income distribution and spending patterns, and such fundamental changes as the transition from a goods-producing to a service-oriented economy. The Bureau of Labor Statistics will continue to monitor the economy closely and apply relevant innovations in statistical indexing and computer technology in order to ensure that the CPI remains the best measure of inflation.

Note

1. Steven D. Braithwait, "The Substitution Bias of the Laspeyres Price Index: An Analysis Using Estimated Cost-of-Living Indexes," *American Economic Review*, March 1980, pp. 64-77.

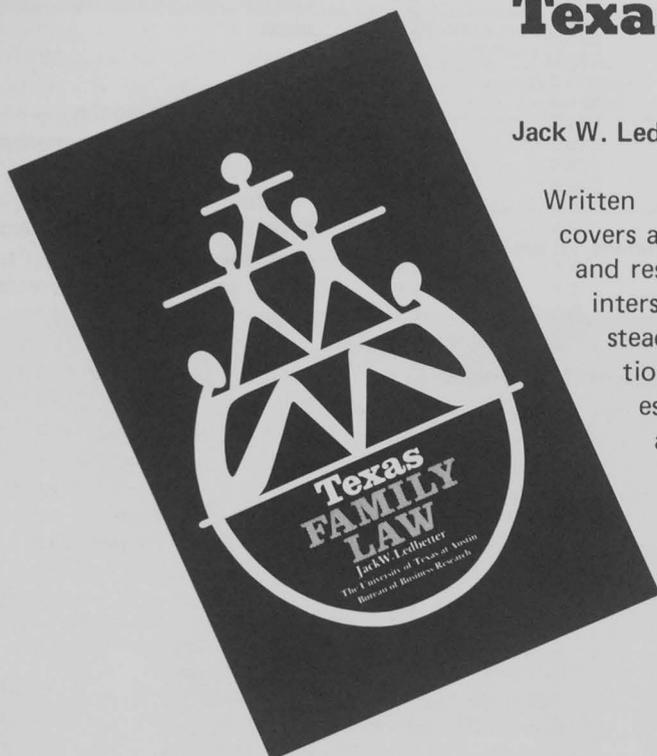
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The Effect of Federal Budget Cuts on Houston

Susan A. MacManus

Robert M. Stein

When Congress adopted President Ronald Reagan's 1982 federal budget, it approved the largest peacetime reduction in domestic spending in U.S. history. The effect of these cuts on the city of Houston will probably be minimal in fiscal year 1982 for a variety of reasons: the city entered federal aid competition later than most cities, it has a fragmented governmental structure, its social service delivery system is a mix of public and private agencies, and most of its federal funds have been used for capital projects. Because the city has avoided great dependency on federal largess, however, it has little fat with which to weather the fiscally hard times ahead. Houston has few luxury items to cut from its budget. It has always chosen to participate in federal programs that it deemed both necessary and desirable to promoting its growth and continued economic vitality. As congressional cuts in capital programs begin to take effect in fiscal years 1983 and 1984, Houston may face greater cuts in immediate programs, services, and staffing than had been anticipated. Continued cuts in federal monies will undermine Houston's ability to maintain and expand its infrastructure and, thus, may threaten the city's most valued governmental service—the ability to promote economic growth.

The Nature and Scope of the 1982 Federal Budget Cuts

To understand the federal budget cuts and their potential effect on state and local governments, one must understand how the cuts were implemented. Essentially two methods for cutting were available to the administration and Congress. First, the appropriation ceiling allowed in the authorizing legislation could be limited. This method effectively places a limit on the money the appropriating

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committee can spend on an authorized program but does not prevent the appropriating committee from making further cuts in the program. The fiscal effects of this technique often take two to three years to be translated into the actual disbursements of monies since most spending programs are authorized for several years with yearly appropriations. A spending ceiling in the authorizing legislation resists spending increases brought on either by inflation or by interest group pressures.

The second alternative is to alter eligibility rules and benefit formulas. This technique is particularly effective for entitlement programs (for example, Social Security or unemployment compensation) where costs often rise independently of legislation or have cost-of-living increases built in. This method has an immediate fiscal effect.

Each budget-cutting strategy is associated with different types of domestic programs, and the two strategies consequently differ in scope, rate, and nature of effect on state and local governments. Capital programs (for example, community development, transportation, and natural resources) were generally cut through changes in budget authorities. Congressional committees generally lowered the appropriation limits in capital programs so that cuts in these programs tend to have less immediate fiscal effects on actual cuts in outlays (see table 1). Cuts in budget authority far exceeded cuts in fiscal year 1982 outlays, suggesting that most of these budgetary cuts will probably not be felt by state and local governments until 1983 and 1984. This effect will be particularly evident in natural resources and environmental grants (for example, wastewater construction) where cuts in budget authority were 36 percent of base, while 1982 outlays were cut by only 8.1 percent.

Social services (education, employment, and training; income security; and health) were largely cut through changes in eligibility and benefit formulas. These cuts produced more immediate results. Though the percentage cut in budget authority exceeded the percentage cut in outlays for two of the three service program categories, the differences were modest and considerably smaller than the differences between outlays and budget authority for capital programs. In health care, cuts in outlays actually

exceeded reduction in budget authority, while health care programs were cut the most in the 1982 federal budget.

The picture that emerges from the 1982 federal budget is one of anticipated rather than actual changes. Cuts in many budget authorities will not be felt until fiscal year 1983, and in many instances the changes adopted in 1982 will continue to be experienced well into fiscal year 1984 and 1985. Moreover, a programmatic pattern is evolving.

mayor, Fred Hofheinz, and the passage of general revenue-sharing legislation.

The city's foray into intergovernmental fiscal relations was not extensive and was skewed toward capital projects. The city bypassed many popular federally funded social service programs, even though it did venture into the Model Cities and Comprehensive Employment Training Act (CETA) programs, and concentrated on getting grants for

For Houston, cuts in federal funds will affect core functions of its local government because the city has used most of its federal monies for integral capital projects.

The effect of cuts on capital programs is not likely to be fully realized in 1982, while social service cuts will have an immediate effect.

Houston and the Federal Aid System

Houston has an unusual relationship with the federal government; in many ways one might characterize it, before 1970, as a nonrelationship. Not until the late 1960s did Houston receive any direct federal assistance.¹ Any dealings of the city, county, or other local jurisdictions with the federal government came through the state in federally sponsored programs (highways) or directly to individuals within the city (Social Security). Not until the 1970s did the city become actively involved with the federal aid system largely because of the election of a liberal

road construction, sewer treatment plants, and airport construction. It still uses nearly two-thirds of its grant monies for capital projects and only 40 percent for services. The city's preoccupation with federally supported capital projects stems from two factors: fiscal and political conservatism and rapid population growth beginning in the 1970s and continuing to the present.

Like many cities in the South and Southwest, Houston's political culture is highly traditional and individualistic. The role of government is "instituted for strictly utilitarian reasons to handle those functions demanded by the people it is created to serve."² Houstonians have been reluctant to participate in the federal government's social welfare programs. The dominant interests in the city (which are commercial and developmental) have never perceived social welfare programs as part of the good society. Moreover, the distribution of monies to low-income individuals

Table 1

Reductions in the Fiscal Year 1982 U.S. Federal Budget

Expenditure category	Budget authority				Outlays			
	Congressional budget office current baseline, fiscal year 1982 (in millions of dollars)	Dollars cut from base	Percentage cut from base	Cut as percentage of total reductions*	Congressional budget office current baseline, fiscal year 1982 (in millions of dollars)	Dollars cut from base	Percentage cut from base	Cut as percentage of total reductions*
Community and regional development	9,510	2,062	21.7	3.9	11,056	1,059	9.6	3.0
Transportation	23,671	2,962	12.5	5.6	22,572	1,920	8.5	5.4
Natural resources and environment	14,006	5,042	36.0	9.5	14,291	1,156	8.1	3.3
Education, training employment, and social services	36,937	9,377	25.4	17.6	35,870	6,417	17.9	18.2
Energy†	9,418	5,540	58.8	10.4	11,422	4,671	40.9	13.3
Income security	283,671	19,430	6.8	36.5	255,736	10,647	4.2	30.2
Health	85,719	2,320	2.7	4.4	76,581	2,791	3.6	7.9

*Dollar figures do not add to 100 percent because of omitted functions.

†Weatherization and income-maintenance programs.

Source: Woodrow Wilson School of Public and International Affairs, *Background Materials on FY 1982 Federal Budget Reduction* (Princeton, N.J.: Princeton Urban and Regional Research Center, Princeton University, 1981).

was seen as undercutting the traditional and individualistic character of Houston's political life.

Houston's rapid growth since the 1960s placed significant pressures on the city's infrastructure. Capital was needed to finance sewer systems, improve and expand roads, and undertake other major construction projects. Federal assistance for capital programs, therefore, was not perceived as a threat to the city's fiscal and political independence but as a pragmatic way to fund capital programs in much the way an individual might borrow to buy a home.

Houston has more overlapping governmental jurisdictions than any other metropolitan area in the nation. Consequently, coordinating and documenting the flow of federal monies into the metropolitan area are difficult. A fragmented service delivery system only hinders individual efforts at seeking and receiving federal monies, since the operation of any aid program (especially social services) requires coordination among local governments. In Houston, federal funds for social services generally pass through local governments to nonprofit social service agencies, which are the real deliverers of social services. This public-private partnership means that the city and county governments are not likely to suffer directly from cuts in social service programs, although they may suffer politically. The real effects of federal cuts in service funding will be felt by the nonprofit organizations and the individuals they serve.

Houston's Fiscal Climate

A city like Houston with a strong revenue base and low demands for costly public services is in a better position to withstand cuts in federal aid than cities in fiscal stress from a declining tax base and increasing demand for government services. Houston's unemployment rate is the sixth lowest in the nation. The average rate of appreciation in property values has been at or above 12 percent annually for the last six years. Houston's fiscal picture is not without blemishes, however. The city and county have not been able to assess property accurately and in a timely fashion. A substantial portion of residential property is severely undervalued and, consequently, property taxes are artificially low. This fact in part accounted for the defeat of a tax and spending limitation initiative last fall. State-ordered reassessment, which will be implemented in the entire county in late 1982, will result in substantial increases in property values and property taxes. Even with provisions for homestead tax relief and commercial and industrial property taxes, the property taxes of the average homeowner will probably increase significantly.

Another referendum on taxing and spending limitations could be devastating, depending on the severity of the limitation. Coupled with shrinking federal monies, a cut in local tax revenues would surely result in program, service, and personnel cuts, though perhaps not immediately. Even the threat of taxing and spending limits can significantly affect the delivery of public services. The uncertainty sur-

rounding the reassessments may lead administrators to be overly cautious in advocating new or expanded programs.

To ascertain the effect of Reagan budget cuts on Houston, we conducted in-depth interviews with administrators in city, county, and special district governments and agencies in order to identify the scope and nature of cuts in personnel, services, and programs. Agencies were chosen by their responsibilities for federal programs cut in the fiscal year 1982 budget. Federal budget cuts were then evaluated by seven criteria: personnel, program, service, and facility cuts; structural changes; alternative revenue sources; and planned service and facilities programs. Each criterion was used to identify whether budget cuts, as opposed to other conditions (declining revenues, state mandates, tax limitations), changed the agency's activities, structure, or policy.

In all criteria categories except planned services and facilities, the Reagan budget cuts had a wider and more immediate effect on local service programs than on capital projects (see table 2). In the long run, however, budget cuts will have a more adverse effect on capital-intensive programs than on social service programs, because Congress made larger cuts in the budget authority than in fiscal year 1982 outlays for capital programs and the effect of cuts on capital programs will only occur in fiscal year 1983 and 1984.

Although cuts in service programs have been greater in scope than cuts in capital programs, not all service reductions have been detrimental to agency operations. Officials in the Texas Department of Human Resources report that cuts in staffing and federal funding will not impair their ability to deliver services. To the contrary, state-mandated staff cuts and federal funding losses have forced the agency to engage in long-term policy and management planning that, they believe, will eliminate duplication of services and unneeded staff without reducing the level or quality of client services. Similar observations were made by officials in Houston's CETA program and the community action agency. In each agency the feeling was that federally initiated aid cuts actually produced a desired programmatic change. Houston CETA officials generally perceived public employment programs as failures and their personnel as burdens to other city and regional agencies. Some agency officials, however, were not tolerant of personnel cuts brought on by reductions in federal assistance. The Hous-

Table 2

Percentage of Local Houston Programs Affected by Federal Budget Reductions, March 1, 1982

Type of effect	Type of program	
	Capital	Service
Program cuts	40	55
Service cuts	20	65
Personnel cuts	10	55
Structural change	0	50
Search for alternative revenues	30	40
Facility cuts	20	25
Cuts in planned services and facilities	80	5

ton Independent School District, for example, has adopted a policy whereby it assumes full financial obligation for any federally funded employee (except administrative personnel) whose funding is reduced or terminated.

Changes in services did not always translate into immediate service cuts. Child welfare administrators said that cuts would in the long run change the agency from a preventative to a coping organization, from reducing the likelihood of child abuse to responding to its occurrence.

Some service agencies were fully informed about revenue cuts as early as September 1981 and had time to prepare for them; many of these agencies have sought alternative funding sources. Though state and local tax revenues are the obvious sources to tap in a period of retrenched federal support, local officials have not limited their search for needed revenues to the public sector. User fees, benefit taxes, and surcharges were also considered as revenue sources. Moreover, a number of agencies (most notably the Gulf Coast Community Services Association, the city's Department of Human Resources [the Title XX office], and the city's Department of Health) have begun soliciting from private companies and foundations for operating monies. The regional office of the Texas Department of Human Resources has already received funding from private foundations and plans to increase its solicitation of these nongovernmental funding sources, as does the Houston Independent School District and both the city and county parks departments.

As expected, capital programs have not suffered as greatly under the first round of federal budget cuts. The Metropolitan Transit Authority, unaffected by immediate cuts, however, expects to delay its rail projects (light and heavy) because of anticipated cuts in federal funding for new transit systems. Similarly, the city's Department of Aviation plans to delay construction of a needed terminal and runway because of reduced or eliminated federal funding for such projects in fiscal years 1983 and 1984.

Officials at the Gulf Coast Waste Disposal Authority, however, expect that the elimination of federal monies will in fact remove a major obstacle to the construction of new waste-disposal facilities. In recent years, delays in federal funding and burdensome federal regulations have hampered new facility construction. Lack of federal funding will force local officials to consider waste-disposal projects without being blocked by federal funding delays and regulations and without having a convenient excuse for not investing in such programs.

Budget cuts affect even agencies that do not receive direct federal aid. The Houston Flood Control District, for example, receives no direct federal assistance but depends on the capital programs of the U.S. Army Corps of Engineers to supplement its own projects. Budget cuts in these operations will end two capital projects planned by the flood control district. Without Corps assistance on these and future projects, Houston flood control efforts will shift from preventative programs to remedying the effects of flooding.

If current trends to cut the federal budget continue, Houston is not likely to fare as well in the future. Houston

has not used federal aid monies to supplement and expand its package of goods and services but has substituted federal monies for own-source revenues. Consequently, future cuts in federal monies will affect core functions of the local governments.

Notes

1. Susan A. MacManus, *The Impact of Federal Aid on the City of Houston* (Washington, D.C.: U.S. Department of Labor, 1979).
2. Daniel Elazar, *American Federalism: A View from the States*, 2nd ed. (New York: Crowell, 1972).

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The 1981 Election for Mayor of Houston

Kent L. Tedin

In 1981 a woman, Kathy Whitmire, was elected mayor of Houston, the city with perhaps the most macho image of any of the country's ten largest metropolises. Whitmire's election was not only a break from Houston traditions regarding gender but also a break in the tradition of pro-growth policy goals and support that has characterized the election of Houston mayors since the turn of the century.

Houston politics has long been dominated by a pro-growth establishment consisting of developers, realtors, architects, engineers, the construction industry, and the downtown banks and law firms that service these other industries. The profitability of these firms and industries is directly connected to the continued growth of the city.

Whitmire's image as a competent technocrat who could bring professional skills, honed in the private sector and in the "apolitical" job of city controller, to bear on the management of city problems may have attracted the vote of the young professional, well-educated population that has been drawn to Houston because of the city's economic opportunities. Thus, this group may wrest control from the pro-growth establishment that was itself probably responsible for the conditions that attracted these voters to the city in the first place.

In order to analyze the factors affecting public opinion in the Houston mayoral race, data were compiled from four opinion surveys: a representative sample of 600 registered voters queried on September 1, 1981; a sample of 400 people on October 15; an exit poll of 500 people on election day, November 3, 1981; and a February 15, 1982, survey of 375 registered voters.¹

The principal source of political influence for the pro-growth sector has been its ability to raise money. In past city elections a premium has been placed on expensive media campaigns. Houston encompasses more than 565

square miles (compared to 46 for Boston, 129 for Philadelphia, and 470 for Los Angeles) and its size makes personal politics difficult. Nonpartisan elections, weak grassroots organizations, and a short campaign period (thirty days from close of filing to election) also contribute to the perceived need for large media expenditures. Something between \$750,000 and \$1 million has been needed to win or be reelected to the office of mayor. The groups most willing to make campaign contributions of that size are those that benefit financially from Houston's continued expansion. Whitmire, however, spent only \$800,000 on her campaign, compared to the more than \$1.5 million spent by each of her two opponents. Her use of a large army of volunteers may have made the difference.

The Candidates

In the 1981 election, incumbent mayor Jim McConn clearly fit into the pro-growth category. McConn was a past president of the Houston Home Builders Association, and his credentials as an ardent supporter of the policies of growth were well documented. During the four years of his administration, however, McConn had run into some problems; scandals involving gambling losses in Las Vegas, the awarding of cable TV franchises, and the mayor's frequent absences from the city had tainted his record. Despite these troubles, McConn announced for reelection in the summer of 1981. It seems doubtful that McConn and his backers fully appreciated the magnitude of the difficulties they faced, but McConn's announcement preempted the possibility of any other serious pro-growth candidate entering the field, and the pro-growth establishment rallied financially to the incumbent mayor's campaign.

After McConn's announcement, four other serious candidates also entered the race. Louis Macey, a former member

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of the city council and McConn's principal opponent in 1979, was endorsed by the executive committee of the Harris County Republican party. A second candidate was Jack Heard, the incumbent sheriff of Harris County, a life-long Democrat, but a conservative on social issues. Third was Al Green, a mostly unknown black justice of the peace. McConn had received 95 percent of the black vote in 1977 and 80 percent in 1979, but Green hoped to capitalize on black voters' disenchantment with the mayor. The fourth candidate was the incumbent city controller, Kathy Whitmire, who had first been elected when Leonel Castillo vacated the job to serve as director of the Immigration and Naturalization Service under President Jimmy Carter. Whitmire and her late husband had been active in liberal political causes in the Houston Montrose area—the counterculture section of the city. After her husband's death in 1975, Whitmire ran for controller and was elected. Despite the fact that she was young, single, and lived in Montrose, Whitmire projected an image as a hard-nosed fiscal conservative. She was not aggressively hostile to the progrowth establishment while controller but was clearly not among its supporters.

Attitudes at the Beginning of the Race

The September 1 survey clearly showed the problem faced by the incumbent mayor. The good news was that he was highly visible: 59 percent claimed to "know a lot" about Jim McConn. Only 41 percent made the same claim about Whitmire, 38 percent about Heard, 28 percent about Macey, and 7 percent about Green. The bad news for the mayor was that he was extremely unpopular. Respondents were asked to name things they liked or disliked about each of the candidates; McConn had three times as many dislike mentions as like mentions (see table 1). Of the mentions about McConn, 34 percent concerned such specific issues as the annexation of Clear Lake City,² the awarding of cable TV franchises, and dissatisfaction with streets and sewers. Thus, about one-third of the respondents had very clear policy disagreements with the mayor. It is sometimes argued that Houston residents, being atypically young and generally not natives of the area, tend to be apathetic about local politics, but the richness of the open-ended criticism of the incumbent indicated fairly widespread attentiveness to the mayor's activities.

Table 1

Respondent Likes and Dislikes about Mayoral Candidates, September 1 Survey		
Candidate	Number of likes	Number of dislikes
McConn	98	339
Macey	101	103
Heard	208	112
Whitmire	367	60

The literature on elections for offices other than president or U.S. senator emphasizes the advantages of incumbency and the role of money as important assets. The September 1 poll, however, showed Whitmire as the choice of 40 percent and McConn as the choice of 13 percent of the respondents, with 28 percent undecided and the rest of the candidates receiving 10 percent or less. A little over two months later, after spending more than \$1 million in an election that drew 280,000 voters, the incumbent received 13.5 percent of the vote. The advantages of money and incumbency obviously have their limits.

Partisanship

A common theme in the literature on municipal elections is that even in a nonpartisan setting political parties can structure the vote. Louis Macey received the endorsement of the executive committee of the Harris County Republican party and, if partisanship is of consequence, this endorsement should have placed him in an enviable position, since he was the only Republican in the race and the Republican party has been highly competitive in recent Houston elections.³ The data, however, showed Macey doing badly among Republicans. The October 15 survey revealed that only 10 percent of those identifying with the Republican party preferred Macey (27 percent preferred Whitmire and another 27 percent preferred Heard). The February 15 postelection poll showed Macey ultimately winning only 20 percent of the Republican respondents. The endorsement seemed to have little effect on the votes of Houston Republican respondents.

An unusual aspect of the city election was that the White House became directly involved in it. On October 30, 1981, a presidential special assistant for intergovernmental affairs urged Houston voters to defeat Whitmire because she was "quite liberal" and "would not be sympathetic to President Reagan's goals."⁴ The White House was thus providing an important partisan cue in an election without party labels. The relation between mayoral vote and party identification and between mayoral vote and a vote for President Reagan in 1980, however, is weak (see table 2). Past support for Ronald Reagan appears not to have been a factor in structuring the vote. Partisanship and

Table 2

Mayoral Vote of White Respondents by Party Identification
and the 1980 Presidential Vote, February 15 Survey*
(In percentage)

Candidate favored	Party identification			1980 presidential vote	
	Democrat	Independent	Republican	Carter	Reagan
Heard	41	50	51	51	46
Whitmire	59	50	49	49	54
All responses	36	20	43	38	62

*Black voters have been deleted and analyzed separately because including blacks falsely raises the relations between partisanship, support for Reagan, and vote in the mayoral race.

presidential politics appear to have been of little consequence in the mayoral election.⁵

Local Issues

In the October 15 poll it seemed apparent that the run-off contenders would be Heard and Whitmire. Whitmire had lost some support since September 1 but was still the front runner. Heard was the only candidate picking up the necessary support to make the runoff. The poll showed Whitmire with 24 percent, Heard with 19 percent, and no one else with more than 13 percent. What role, if any, did local issues play in the choice between Heard and Whitmire?

The survey data indicate that local issues had only a minor impact. In the election-day survey, for example, respondents were asked to identify the single most important problem facing Houston. The most frequent response (48 percent) was crime. In addition, respondents felt that the mayor can affect crime. The October 15 survey showed that 36 percent thought the mayor could do "a lot" about crime and 37 percent thought the mayor could do "something." Most of Heard's campaign rhetoric focused on crime and the police as the incumbent sheriff tried to capitalize on his background in law enforcement. Students of public opinion frequently refer to issues like crime as *valence issues* because everyone opposes crime and no one is arguing in favor of crime, but there were real differences between Heard and Whitmire on issues related to crime and the police. For example, Whitmire favored having the chief of police appoint assistant chiefs and Heard wanted them to be chosen through civil service. Given the salience of the issue, some genuine differences between the candidates, and

Heard's clear campaign posture as the law-and-order candidate, one might expect substantial correlations between attitudes on crime and police matters and the vote; those relations that did exist were, however, modest to weak at best (see table 3). Respondents listing crime as the most important issue were more likely to vote for Heard than were those listing some other problem; but even among those who listed crime first Heard took only 51 percent—barely a majority—of the vote. The same was true with regard to beliefs about the factors causing crime. Heard did somewhat better among those who saw laxity in law enforcement as a major factor in crime (54 percent); Whitmire did somewhat better among those who believed social problems to be a major factor in crime (59 percent), but the differences are at best modest, and of those mentioning laxity Whitmire still received 46 percent of the vote. The same pattern appeared in the responses to the statement: "The Houston police need a friend not a critic serving as mayor." Only a modest relation exists, with Heard doing well among those who agreed that the mayor should be a friend (57 percent).

Other conventional issues proved to have little or no discernible effect on the vote because the issues were never really raised and debated. Respondents to the election-day poll indicated that streets and traffic constituted the second most important problem facing the city, but the two major candidates' proposals to solve the transportation problem did not differ. Both advocated synchronized street lights, more one-way streets, and greater accountability from the Metropolitan Transit Board, and both expressed opposition to a fixed rail system—at least in the short term. Twelve items tapping attitudes toward traffic and transportation had no statistically significant relation with choice for mayor.

Table 3

Cross-tabulation of Police and Crime Issues by Mayoral Vote
(In percentage)

Candidate favored	Most important issue (November 5 poll)		Factors causing crime (October 15 poll)			Police need friend not critic as mayor (February 15 poll)		
	Crime	Other	Enforcement laxity	Social factors	Other	Agree	Undecided	Disagree
Heard	51	37	54	41	45	57	30	28
Whitmire	49	63	46	59	55	43	70	72
All responses	48	52	36	43	21	55	21	26

Table 4

Cross-tabulation of Progrowth Attitude by Mayoral Vote, October 15 Poll
(In percentage)

Candidate favored	Attitude toward annexation			Attitude toward annexation of Clear Lake City		
	Annexation is good	Undecided	Annexation is bad	Favor annexation	Undecided	Oppose annexation
Heard	51	57	51	53	72	51
Whitmire	49	43	49	47	28	49
All responses	29	30	41	20	11	69

The success of California's Proposition 13 spawned a similar Houston measure that was included on the general election ballot. The proposal would have limited the city's property tax rate to \$0.50 (down from \$0.84) for each \$100 of assessed valuation. Proponents argued that such a measure was the only way to hold down local taxes, while opponents held that it would undermine the city's tax base and bond rating. Unlike crime and traffic, tax limitation proposals are not valance issues; they have two sides. The issue basically split the Houston electorate, with 48 percent favoring the proposition and 52 percent opposing it, but as far as the mayor's contest was concerned the issue was depoliticized: Whitmire favored the principle, but opposed the particular proposal on the ballot and promised to come up with her own tax limitation amendment later. Heard took no position at all, stating publicly that he had not made up his mind. As a consequence, tax policy was never an issue, and the data show no relation between a vote on the property tax amendment and a vote for mayor.

With Mayor McConn out of the race, both candidates took essentially the same position on the question of growth. Heard and Whitmire promised not to annex additional territory unless adequate services were being provided to the existing city and both favored the deannexation of Clear Lake City. Not surprisingly, there was no relation between questions of annexation and the vote choice (see table 4). The two candidates' positions concerning annexation were basically in line with popular opinion since the October 15 survey showed that 41 percent believed that annexation was bad and 69 percent opposed annexation of Clear Lake City. With this low level of public support and other political conditions working against annexation, the physical growth of Houston may be coming to an end.⁶

Demogogic Issues

Some writers argue that without the stabilizing and moderating influence of party labels municipal elections are often characterized by demogogic appeals. Two issues were raised in the 1981 campaign that were potentially demogogic: the desirability and competency of a woman as mayor and Whitmire's support from the Gay Political Caucus (GPC).

Suggestions that a woman could not handle the job were never made directly by any candidate but were implied. The Heard camp featured a radio and television ad that announced that Houston needed a "tough man to do a tough job," with the emphasis clearly on "man." The implication, of course, was that a woman would have difficulty in the demanding job of mayor of Houston. To test for voter reaction to such appeals, two identical items from the September 1 and February 15 polls were cross-tabulated with vote choice. On both surveys, respondents were asked whether Whitmire's gender would make it easier or more difficult to run the city effectively or whether it would make no difference. The most interesting aspect of these two surveys is that the relation in September between the woman-as-mayor item and the vote almost completely

disappeared in the postelection survey.⁷ In the February survey only those who thought a woman would have a "considerably more difficult time" running the city gave majority support (59 percent of respondents) to Heard, and this support was down from 69 percent in the September poll. Exposure to the campaign of a competent woman probably helped overcome sexual biases about women holding high public office. While these biases may still have existed on election day (the percentage believing that a woman would have a difficult time running Houston did not change between the September and the February surveys), those holding biases found it easier to support Whitmire on election day than they had before the campaign began.

The second potentially demogogic issue involved the long-standing support that the Gay Political Caucus had given to Whitmire. Whitmire had been endorsed by the GPC in her contests for controller and in her bid for mayor. Unlike the gender issue, the issue of Whitmire's homosexual support was raised directly, vocally, and frequently. A full-page ad in the November 1 *Houston Post* and a Mailgram sent to 107,000 registered voters two days before the runoff both portrayed Whitmire's support from the GPC negatively. Heard himself made his opposition to gays clear but did not attack Whitmire in this context. Given the frequency with which the gay issue was raised, most of the electorate must have understood where the two candidates stood on the issue. In both the September 1 and the February 15 polls respondents were asked whether they would be more likely or less likely to vote for a candidate endorsed by the Gay Political Caucus or whether it would make no difference. Of those in the postelection survey who had said such an endorsement would make them considerably less likely to vote for a candidate (19 percent), 70 percent voted for Heard. However, the gay issue behaved very differently from the gender issue, as the homosexual endorsement issue became more strongly related to voter choice as the campaign progressed.⁸ Thus it appears that the issue played a role in structuring the vote. Causality on these questions is never unambiguous, but apparently some voters employed candidate differences concerning gays as part of their voting decisions. Only a small part of the electorate, however, was extremely hostile to gays. While these voters overwhelmingly supported Heard, there were not enough of them to prevent Whitmire from winning a landslide victory. Second, the data cannot tell us whether the gay issue helped or hurt Whitmire's totals; there may have been a backlash that outnumbered the votes gained.

Demographics and Ideology

According to the 1980 census, Houston is 52 percent white, 27 percent black, and 18 percent Hispanic. Blacks and whites turn out for municipal elections at approximately equal rates, with Hispanics voting at much lower rates (Hispanics constitute only about 8 percent of the electorate). With one exception, blacks have always given over 90 percent of their vote in a runoff to a single candi-

date (the exception being when McConn got 80 percent in 1979). In 1981 Whitmire got 95 percent of the black vote. Whitmire's overwhelming success among blacks in the runoff rests to a large extent on the fact that Jack Heard, incumbent sheriff and former Houston chief of police, was totally unacceptable to the black community. The relationship between blacks and the Houston police has been one of suspicion and, often, hostility.⁹ The best Heard could hope for was something less than total rejection from the black community. Whatever his chances among blacks they were damaged, perhaps fatally, early in the campaign when a local television station ran a news story in which the Ku Klux Klan, pictured complete with burning crosses, endorsed Heard for mayor. Whitmire herself, however, was personally popular among blacks. She received 23 percent of the black vote in the general election. (Green received most of the black vote.) Black respondents in the postelection survey were asked to evaluate a variety of public figures on a one-to-five scale with five being the most positive. Heard received a mean rating of 2.2, Whitmire 4.1; for comparison, U.S. Senator Edward Kennedy was rated 4.0. Whitmire's strong showing among blacks was apparently not based entirely on the unacceptability of the sheriff.

About 70 percent of the vote in Houston municipal elections comes from predominantly (90 percent or more) white precincts. These precincts split their vote fifty-fifty between Heard and Whitmire (Hispanic precincts voted 59 percent to 41 percent for Whitmire). The standard assumption was that the bulk of the Whitmire support among whites came from young, well-educated professionals, and the data from the postelection survey support this position. Journalistic reports suggest that the combination of being young and educated was the important factor, but survey data suggest that age and education had independent effects and that their interaction did not affect voting choice.¹⁰

In partisan elections income is a good predictor of Houston's white vote, but it was not for the runoff.¹¹ Campaign allegations that Whitmire was too liberal for Houston apparently did not divide the white community along income lines. A major theme of the Whitmire campaign was the need for frugal governmental management patterned along the lines of private industry. In the postelection survey, respondents were asked if they thought Whitmire was liberal, moderate, or conservative on economic and social issues; 42 percent saw her as liberal on social issues and 21

percent saw her as liberal on economic issues. Only 12 percent saw her as conservative on social issues, but 40 percent thought she was conservative on economic issues. By cultivating an image as an economic conservative Whitmire was apparently able to defuse the general criticism that she was too liberal.

The mediating variable between age, education, and the vote is political ideology. Houston whites are very conservative on economic questions; only 5 percent considered themselves liberal while 56 percent labeled themselves conservative (see table 5). On the other hand, Houston whites are not necessarily conservative on social issues; 18 percent defined themselves as liberal, 34 percent moderate, and 45 percent conservative. A cross-tabulation between economic ideology and vote choice shows a very clean break. With only 5 percent of the respondents in the liberal category, this dichotomy is basically conservative or nonconservative. The relation to the vote is somewhat stronger in the case of social ideology: 18 percent considered themselves social liberals, and their overwhelming support for Whitmire (92 percent) was of consequence for the total vote.¹² Economic issues apparently did not play a major role in the 1981 election. Rather, social issues were the ones that were raised (if not debated). As the runoff approached, the real issues were often eclipsed by questions about which candidate was the most moral. Regression analysis (a statistical method that finds relations between one variable and one or more other variables) indicates that in the 1981 election age and education separately influenced social ideology, and social ideology then influenced vote choice. This model suggests that the young and well educated may in the end play a large role in wresting control from the progrowth establishment.

Whitmire won because she had wide-ranging personal appeal across the electorate; she was able to win without establishment support and spent only about one-half the amount McConn and Heard spent on their campaigns. Even though Heard was unacceptable to the black community, Whitmire did not receive black support by simple default; rather, she was positively evaluated by blacks. Among whites, the highly divergent images of Heard and Whitmire, rather than their stands on issues, are the keys to understanding their support. Both in dress and manner, Whitmire cultivated the image of a highly competent technical professional. She asserted that she was not interested in the old politics of deal-brokering and favoritism among either blacks or whites and that under her administration city government would be run like a business. Heard, however, was much more of a traditional politician; no one would accuse him of being a technocrat. His image was cast along traditional lines of law and order, strict discipline, and traditional moral values. Among many of the well-educated,

Table 5

Cross-tabulation of Economic and Social Ideology
by Mayoral Vote of White Respondents, February 15 Survey*
(In percentage)

Candidate favored	Economic ideology			Social ideology		
	Conservative	Moderate	Liberal	Conservative	Moderate	Liberal
Heard	61	28	13	66	37	8
Whitmire	39	72	87	34	73	92
All responses	60	35	5	45	34	18

*Black voters were excluded from the data for the same reasons as those outlined in table 2.

relatively young voters who fill high-paying jobs in Houston, that traditional image is not particularly attractive.

Notes

1. The November 3 poll was based on a sample of twenty precincts, stratified to represent the city by race and income, and used personal interviews. Samples for the remaining three surveys were taken from the list of the registered voters, stratified by race and income, and interviews were conducted by telephone.
2. Clear Lake City, adjacent to the Johnson Space Center and twenty-five miles from downtown Houston, was annexed in 1978 amid considerable controversy.
3. Ronald Reagan took 60 percent of the two-party vote, and, more importantly, Republicans won ten of twenty-one contested county offices with an average vote of 49 percent.
4. A spokesman for the president later said the president does not endorse candidates in local races, but it was never made clear whether or not the White House agreed with the statements.
5. The correlation coefficient for the relation between party identification and vote in the runoff was only .14 (a coefficient of .00 means no relation exists and a coefficient of 1.00 means there is a perfect relation between two variables). By contrast, the relation between party affiliation and vote in the 1980 presidential election yielded a coefficient of .75 among white Houston voters, but the relation between a vote for Reagan in 1980 and mayoral vote in 1981 was only .12.

6. When Clear Lake City was annexed, the city was required to change its at-large system of electing city council members to a system in which nine members were elected by district and five at large. Under the Voting Rights Act, additions to the city may require a change in the districts and such changes could affect all districts with unforeseeable consequences to incumbents. These pressures are likely to discourage annexation sentiments among members of the city council.
7. The relation between the gender issue and the vote in the September 1 poll was .28; in the postelection poll it was .06.
8. In the September poll the relation between the issue of homosexual endorsement and the vote was .36; in the postelection poll it was .53.
9. See Tom Curtis, "Support Your Local Police," *Texas Monthly*, September 1977, pp. 82-89, and D. A. Williams and Ron Henkoff, "Houston: It's Like Dodge City," *Newsweek*, August 27, 1979, p. 26.
10. The relation between age and vote choice was .36 and the relation between education and vote choice was .27. Regression analysis indicated that an additive model better fit the data than did a multiplicative model.
11. The relation between income and the 1980 presidential vote was .56 and that between income and the 1980 congressional vote was .51, but the relation between income and the 1981 mayoral runoff was .06.
12. The relation between economic ideology and vote choice was .55 and that between social ideology and vote choice was .61.

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The Gross Regional Product of Texas and Its Regions

Thomas R. Plaut and Mildred C. Anderson. 1981. \$6.00 plus tax.

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Charles P. Zlatkovich. 1981. \$7.00 plus tax. Published with the Texas State Historical Society.

Previously unpublished information on railroad construction and abandonment in the state. The author offers maps of rail networks from 1860-1980, describes the development of the rail networks in Texas, and comments on the situation at present.

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Malcolm Gillis and Ignatius Peprah. 1981. \$5.00 plus tax.

The study covers recent changes in severance taxes on coal and uranium, assesses the outlook for aggressive and passive state taxation policies, and considers the effects of such taxation on production, investment, and the environment. While the primary focus is on Sunbelt states, data from other states are presented for comparison.

Economic Change along the U.S.-Mexican Border: The Case of Brownsville, Texas

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The author examines the industrial development and economic change in the border city of Brownsville. The findings are likely to be applicable to other southwestern border cities as well.

Where Do New Texans Come From?

David A. Plane

Texas, and specifically the large cities of Texas, exerts a great attraction for migrants from the four states immediately adjacent and also for migrants from New York, Ohio, Delaware, Illinois, Connecticut, Virginia, Michigan, Pennsylvania, Indiana, New Jersey, and Maryland. Of the total flow of population into the state, however, 72 percent did not add to population increase in 1978–1979 because of losses of Texas population to other states, especially states in the Pacific Northwest, the Rocky Mountain states, and Alaska and Hawaii.

The ratio of total net migration to total gross migration is called the *efficiency* of migration.¹ If all migrants into Texas added to the population growth of the state, then Texas would have a migration efficiency of 100 percent. In reality, Texas had a migration efficiency of 16 percent in 1978–1979. In that period, however, the ratio for Texas was exceeded only by those for Florida (27 percent), Nevada (25 percent), Arizona and Washington (22 percent each), and Oregon (18 percent).² The overall demographic efficiency of all interstate population movements in the country in 1978–1979 was 11.9 percent.³

The most widely available and quoted statistics on population movements are data on net migration—the total population change in a place caused by movements of people from or to all other places. Net migration figures, however, hide a rich geography of interregional population movements. Fuller understanding of this geography may be useful in identifying the underlying causes and future course of population growth.

Demographic Efficiency and Interstate Migration Exchange

There are, really, no such creatures as net migrants to Texas. It is impossible to say whether the new family next door (which just moved in from New Jersey) is composed of net migrants. While some people are moving into Texas, others are moving out (even to New Jersey), and it is not possible to decide which new in-migrants actually add to

Texas population growth. Most of the inflow of people into Texas is, in fact, canceled out by the outflow leaving the state. Every migration stream from one state to another is matched by a nearly equal opposite stream. This general tendency of interregional migration systems was first noted by Sir Ernest George Ravenstein, who studied population movements in Britain in the 1880s.⁴

In examining the geographic pattern of in-migration to Texas, one can analyze the effect on growth of each migration stream between Texas and any other state. The net migration exchange between, say, Arizona and Texas is the difference between the number of migrants into Texas from Arizona and the number of migrants out of Texas to Arizona. Of the forty-nine such net migration exchanges that it has with the other states, Texas in 1978–1979 gained population in forty of the exchanges, including that with Arizona. Texas' total exchange with Arizona is the sum of the number of migrants moving from Arizona to Texas and the number moving from Texas to Arizona. The efficiency of migration exchanges for Texas can be computed as the ratios of the net exchanges to the corresponding total exchanges and can be expressed in percentages (see map 1).

Texas has highly efficient exchanges with the Northeast and Upper Midwest sections of the country; the migration exchange with New York is, from the viewpoint of Texas, the most efficient. Significantly large positive exchanges for Texas also take place with South Carolina and Florida. Although the total exchanges between Texas and its neighboring states are huge, the demographic efficiency of these exchanges is low. Texans moving to Louisiana, Arkansas, Oklahoma, and New Mexico almost equal the number of people from these states migrating to Texas. Texas, however, loses population in the migration exchanges with a group of Pacific Northwest and Rocky Mountain states, as well as with Alaska and Hawaii.

Life in Texas in the future will certainly be influenced in different ways depending on where new residents were raised and where they had previously lived. Economic planners may find it helpful to know the states over which Texas holds a comparative advantage as a potential migration destination. The different industrial structures found in different states result in diverse combinations of job

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skills. Sources of in-migration, therefore, have important implications for the future quality of the Texas labor pool. The future magnitude of Texas population growth will be significantly influenced not only by what is happening to the Texas economy, but also by what is happening to the economies of those states that have traditionally sent sizeable numbers of migrants to Texas.

The Gravity Model of Migration

Other things being equal, one would expect to find more migrants to Texas from large states than from small states

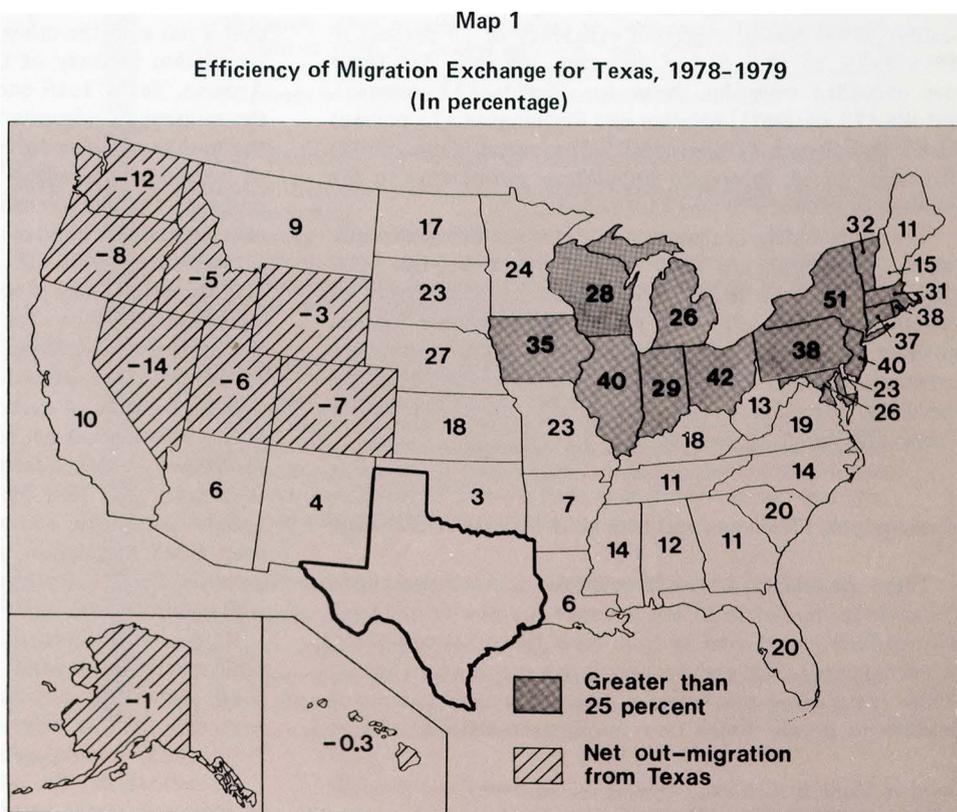
for which Texas is an especially attractive migration destination for economic, climatic, or other reasons, both size and distance effects must be controlled. States for which Texas holds a significant comparative advantage over other potential destinations could be identified by comparing the actual migration flows to the flows that would be predicted based only on the relative sizes of the states' migration pools and the states' relative positions.

A geographic model widely used to provide predicted flows based on size and intervening distance is the gravity model, so named because it was first adopted to the modeling of geographical flow by analogy to Sir Isaac Newton's formula for the gravitational force exerted be-

Texas has highly efficient migration exchanges with states in the Northeast and Upper Midwest; large positive exchanges also take place with South Carolina and Florida.

and from nearby states rather than more distant states. For instance, a larger percentage of Texas interstate in-migrants come from California (10.6 percent in 1978-1979) than from roughly equally distant Nevada (0.4 percent). Also, more new Texans are ex-Oklahomans (6.2 percent in 1978-1979) than former residents of roughly equally populous Iowa (1.2 percent). In 1978-1979 all but one of the ten states contributing more than 3.0 percent of the total in-migrants to Texas are either contiguous (Louisiana, Arkansas, Oklahoma, and New Mexico) or have large populations (California, New York, Illinois, Ohio, and Florida). The tenth state, Missouri, combines a sizeable population with fairly close proximity to Texas (see map 2). A rather different picture of gross migration patterns emerges when one considers the percentage of all out-migrants from each state who choose Texas as their destination. In 1978-1979, Texas was the destination of more than 8 percent of the out-migrants from a broad Sunbelt group of states (see map 3). In these percentages the varying sizes of states of origin have been controlled for; distance from Texas, however, is still a dominant factor influencing the pattern. To identify the states

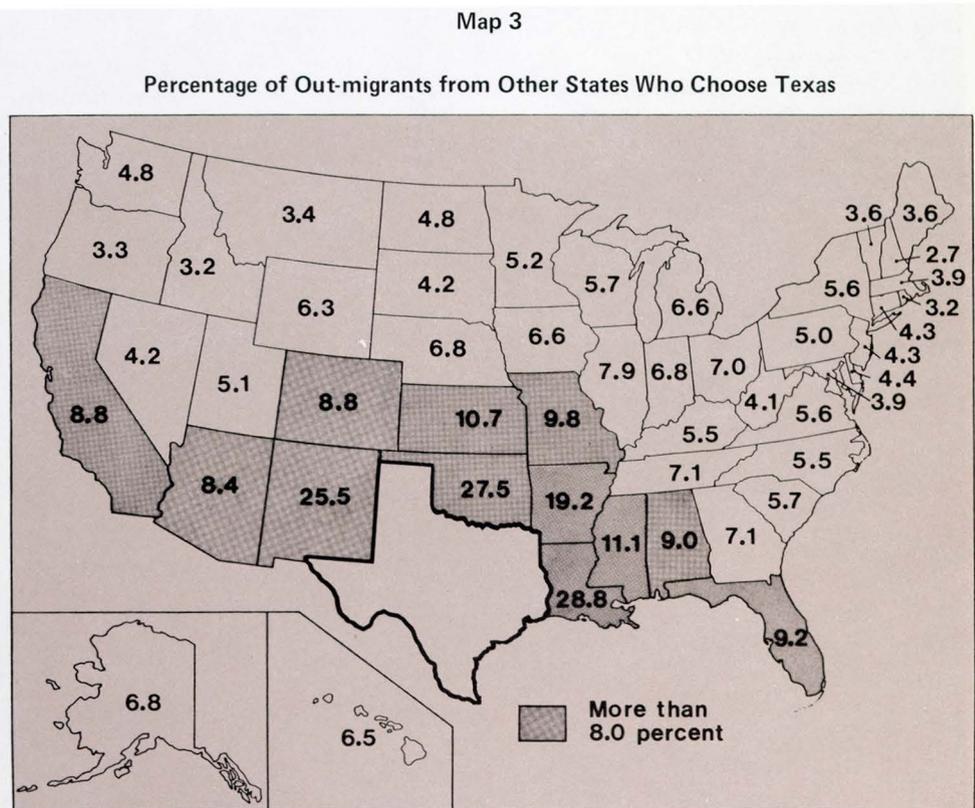
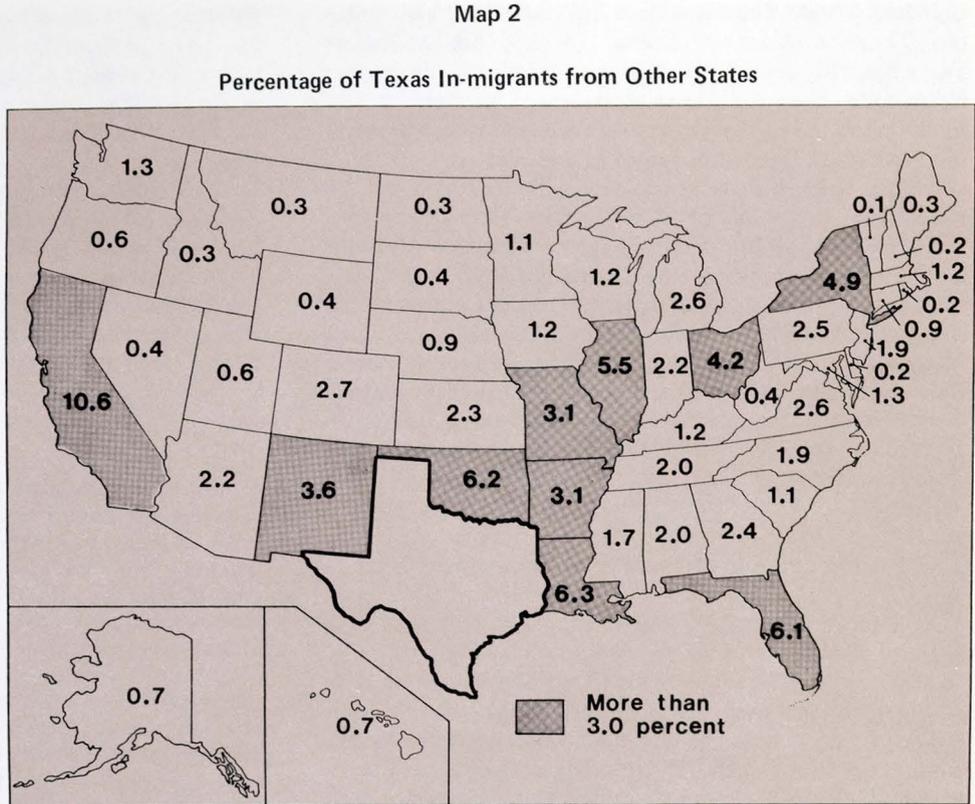
tween two objects.⁵ Migration flows between states should be directly proportional to the size of the states of origin and destination and inversely proportional to the intervening distance. Great-circle distances between state population centers are used to measure distance. Since Texas competes with other states only for the pool of persons



actually inclined to migrate, the number of out-migrants and in-migrants rather than total state populations can be used to measure origin and destination size. The sum of all predicted flows out of each state will, therefore, have to be equal to the given numbers of out-migrants, and all predicted flows into each state must add up to the given numbers of in-migrants. With the imposition of these requirements, the model is doubly constrained. Most commonly applied to predict place-to-place traffic flows for urban transportation planning, doubly constrained models take into account the average level of migrant push factors in each state (because the overall level of out-migration is used) and the average level of pull factors. Deviations of actual flows from flows predicted by such models can be used to determine for which states the expanding Texas economy, the state's sunshine, and other factors exert more than average attraction. Deviations also identify those states for which Texas has less than average attraction.

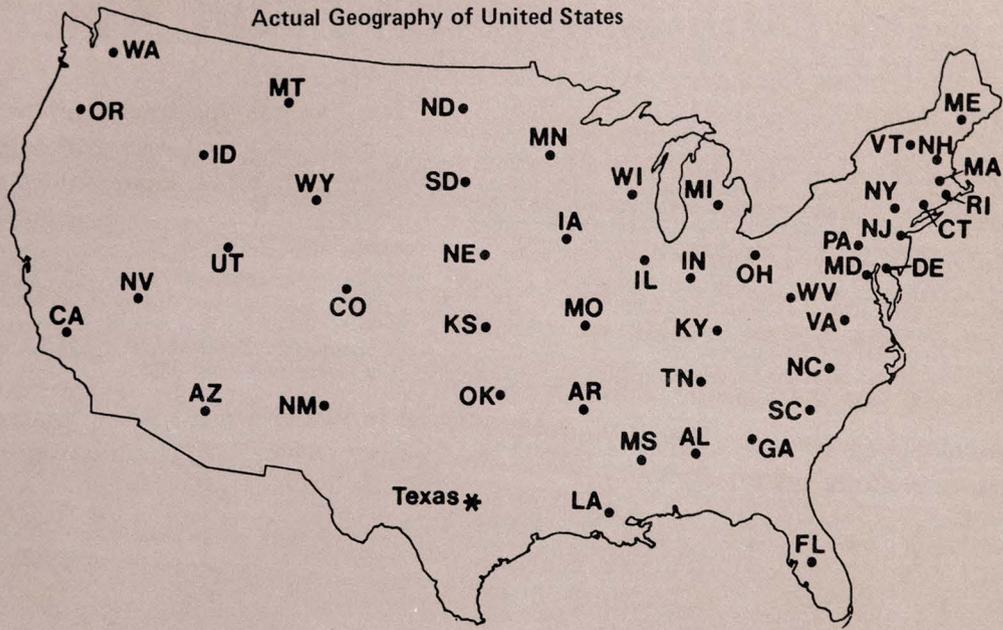
A doubly constrained model was used to estimate the expected levels of the 2,256 migration flows between the forty-eight contiguous states (see map 4). The actual flows were then divided by these estimates. The results show Texas having a stronger than expected attraction for the four immediately adjacent states (even after the influence of proximity is taken into account) and for states in the Middle Atlantic and Manufacturing Belt regions.

Larger numbers of people move back and forth between the adjacent states and Texas. The spheres of influence of Texas' largest cities extend well beyond the state boundaries. Dallas, Houston, and certain other big Texas cities are regional centers at a higher level in the national urban hierarchy than the cities in the states sur-

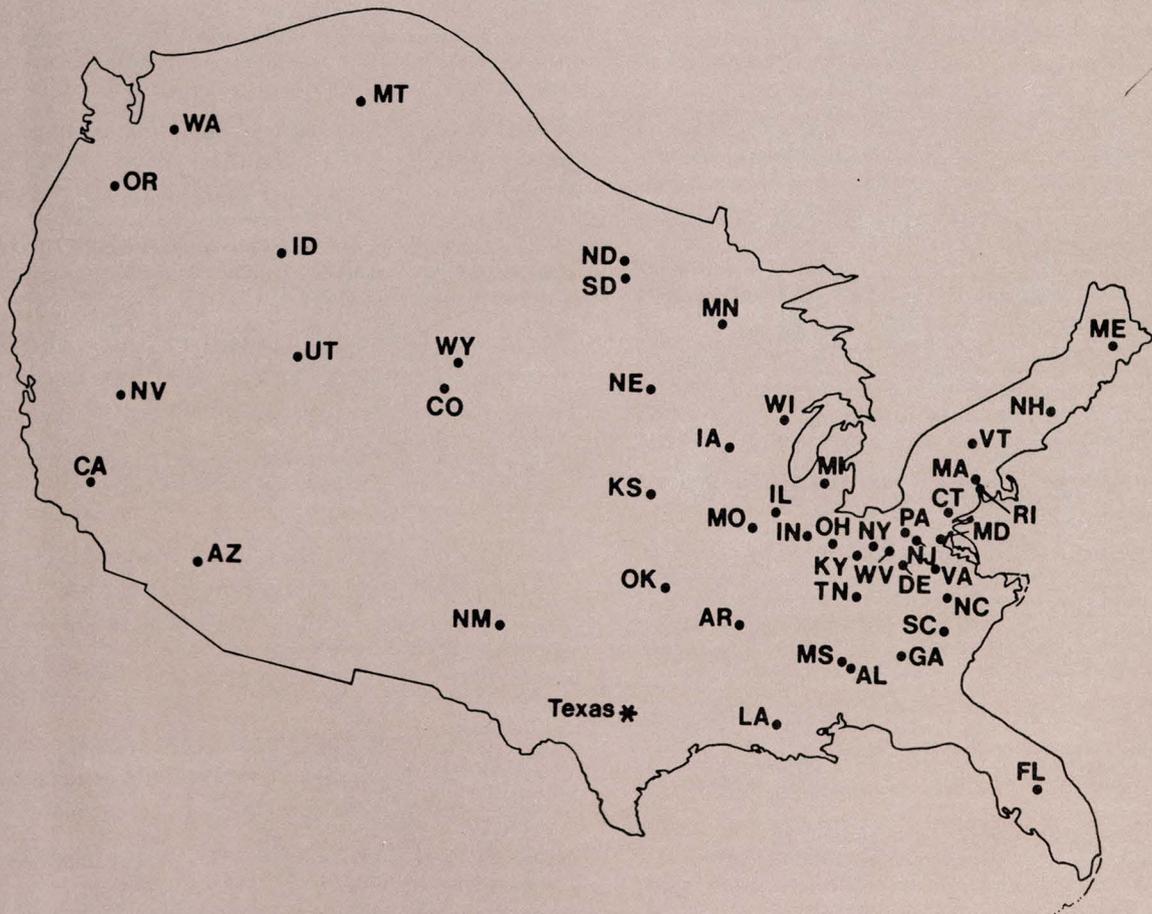


Map 5

Actual Geography of United States



Functional Migration Geography of United States



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Mexico's Foreign Trade and Balance of Payments

Charles E. Butler

Since 1970, interruptions have occurred in the Mexican economic growth rate (in 1971, 1975–1977, and 1982), the inflation rate has accelerated, and on three occasions support for the peso has been withdrawn—in August 1976, February 1982, and August 1982. The latter actions resulted in the peso's fall from 12.5 to the dollar to 22.5, then to 49, and ultimately to 125 by September 1, 1982, when the government dropped free convertibility, instituted strict currency controls, and nationalized commercial banks in response to the deepening financial crisis.¹ Also since 1970, vast new oil finds have made Mexico fourth in the world in reserves of crude oil. (On September 1, 1981, Mexico had proven crude reserves of 67.8 billion barrels; Saudi Arabia, the leader, had 168 billion barrels on January 1, 1981.²) The subsequent increase in oil production was accompanied by Mexico's entry into the international petroleum market, and oil exports rapidly became a large part of total exports as total exports became a larger part of total national output. The oil boom was accompanied by increased imports, foreign borrowings, and economic growth. The world oil glut of 1981 and high interest rates on an enormous foreign debt were the immediate causes of the present crisis, and current predictions are for no growth in 1982 and an inflation rate of about 100 percent.³

Mexico continues to export a small amount of petroleum products and may expand natural gas exports, but for the recent past and near future, crude oil exports dominate the foreign sector. Exports of crude oil began in 1975 and earned \$0.4 billion, 16 percent of the value of all merchandise exports. Six years later, in 1981, exports of crude oil had risen to \$14.4 billion and were 72 percent of merchandise exports. In fact, because of the fall in world prices, 1981 oil exports brought in about \$4.6 billion less than expected.⁴ In 1982, oil exports are predicted to bring in a total of \$12 billion, a drop for the first time since the oil boom began.⁵

In 1973 (a year reasonably typical of the early 1970s) 46 percent of Mexico's merchandise exports were such manufactured products as chemical products, textiles, and food and drink (see table 1). The largest single manufactured category was food and drink, 10 percent to 12 percent of merchandise exports. Sugar alone accounted for more than 50 percent of manufactured food and drink exports, or 5 percent to 6 percent of all exports. Agriculture and fishing is a rather volatile category from year to year, but in 1973 it accounted for 44 percent of merchandise exports. No single item dominated—cotton at 6 percent to 8 percent of total merchandise exports was the single most important agricultural and fishing product, followed by coffee beans, tomatoes, live cattle, meat, and shrimp. The remaining category, extractive industries, made up 10 percent of merchandise exports in 1973 and consisted of such metals as sulphur, copper, flourite, lead, salt, and zinc and of petroleum products (1 percent). The export structure as it existed in 1973 was the result of a diversification occurring since 1950. The major exports—cotton, sugar, coffee, and shrimp—together accounted for one-half of merchandise exports in 1950 and gradually fell to one-fourth by 1973. Cotton, which alone had accounted for 26 percent of merchandise exports in 1950, suffered the greatest decline to 7 percent. Throughout the 1950s and 1960s, petroleum products accounted for 3 percent to 6 percent of all merchandise exports.

From 1974 to 1981, real gross domestic product (GDP) increased by an average of 6.3 percent.⁶ Real exports of products other than oil increased by only 2 percent a year, but real merchandise exports including oil increased by 22.5 percent a year. Thus, during these seven years nonoil exports fell as a share of GDP, although through 1979 their composition had not changed. The 1980 drop in agriculture and fishing relative to manufactures may be a temporary phenomenon related to the drought of 1979.

The extent to which merchandise imports exceeded merchandise exports dropped from 84 percent to 21 percent from 1973 to 1980 and to 20 percent in 1981.⁷ Thus merchandise imports have grown less rapidly than merchandise

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exports, but, doubtlessly, they have grown more rapidly than would have been the case without the expanding oil revenues. The share of consumer goods in total imports actually dropped from 22 percent in 1973 to 13 percent in 1980, though the 1980 share is approximately double that of the previous four years, perhaps reflecting high food imports as a result of the 1979 drought. In real terms, consumer goods imports grew at 7.9 percent a year, slightly greater than GDP growth but much less rapid than oil

gaseous hydrocarbons, continue to be 2 percent to 3 percent of total imports. Producers goods imports grew from 1973 to 1980 at a rate of 18.3 percent a year, rising as a share of GDP and using up some of the increased oil revenues for inputs into the petroleum industry and for other purposes.

The United States continues to be the dominant partner in Mexico's merchandise trade (see table 2). In 1973 58.3 percent of merchandise exports went to the United States

Mexico continues to export a small amount of petroleum products and may expand natural gas exports, but crude oil exports will continue to dominate the foreign sector.

revenues. Thus, oil revenues are not being "squandered" on vast increases in consumer goods imports. Imported producer goods were divided about evenly between primary materials and investment goods through 1979, but the share of investment goods dropped significantly in 1980. This drop may reflect a recent decrease in imports for the petroleum industry. Imported primary materials included various chemicals, ferrous metals, auto assemblies and parts, and a variety of such other goods as petroleum products, seeds, phosphates, glass, and aluminum; investment goods included machinery, precision instruments, and tractors. In 1973, Mexico was a net importer of petroleum products, and imports of petroleum products, primarily fuel oil and

and 59.7 percent of merchandise imports came from the United States; in 1980 63.2 percent went to the United States and 65.6 percent came from the United States. Thus, since Mexico became an oil exporter, the relative position of the United States as a trading partner with Mexico has actually increased. Mexico still retains a trade deficit with the United States; imports exceeded exports by 73 percent in 1973 but only by 32 percent in 1980. Oil sales have therefore reduced but not eliminated Mexico's trade deficit with the United States. After the United States, Mexico's two main trading partners in 1973 and 1980 were Japan and West Germany, each accounting for 5 percent to 7 percent of Mexico's imports and 2 percent to 7 percent of Mexico's exports. Mexico's trade with the developing countries remains small, but Mexico has developed a definite surplus position with these countries; in 1980 exports were approximately double imports.

Current account inflows and outflows include more than transactions associated with merchandise flows and more than the addition of service flows to goods flows. Exports and imports of goods and services add to merchandise trade, services (such as tourism), border transactions, and transportation earnings. Current account transactions also include other inflows and outflows of currency, such as those associated with net factor payments (profits and interest) and transfer payments. In addition to merchandise imports, an important outflow on current account

Table 1
Mexican Exports and Imports by Commodity Group, 1973 and 1980

Category	1973		1980	
	Millions of dollars	Percentage of total	Millions of dollars	Percentage of total
Total exports	2,070	100.0	15,304	100.0
Manufacturers*	960	46.4	2,952	19.3
Agriculture and fishing†	904	43.7	1,544	10.1
Metals‡	182	8.8	503	3.3
Crude petroleum	—	—	9,878	64.5
Petroleum products	25	1.2	427	2.8
Total imports	3,813	100.0	18,572	100.0
Consumer goods§	851	22.3	2,426	13.1
Primary materials**	1,414	37.1	11,028	59.3
Investment goods††	1,549	40.6	5,119	27.6

*Chemicals (plastics, acids), food and drink (toasted coffee, sugar, tequila), textiles (cotton fabric, spun henequen), construction materials (copper tubes, cement, tile, glass), transport vehicles (trucks, buses), and metallurgy (iron and steel pipe, structural parts).

†Tomatoes, live cattle, meat, coffee beans, cotton, resin, fresh strawberries, beans, chickpeas, cocoa, fresh and frozen vegetables, cantaloupe, watermelons, tobacco, honey, fresh fish, and seafood.

‡Sulfur, copper, flourite (calcium flouride used to promote fusion of metals), lead, salt, and zinc.

§Nondurables (wheat, corn, drinks) and durables (books, clothing, watches, automobiles).

**Chemicals, ferrous metals, auto assemblies and parts, fertilizers, industrial chemicals, petroleum products (primarily fuel oil and gaseous hydrocarbons), and other materials.

††Electrical and mechanical machinery, precision instruments, tractors, metal tools, musical and television equipment, railroad and highway transportation equipment.

Source: Banco de México, *Informe anual*, 1974, pp. 84-89; 1980, pp. 177-99.

results from repatriated profits and interest payments. Indeed, the large net negative items on current account are merchandise account and repatriated profits and interest payments (see table 3). These net negative items are partially offset by positive net earnings in tourism, border assembly plants, and border transactions. The aggregate positive net earnings of these three, however, has never been enough to offset the deficits in the merchandise account and the repatriated profits and interest account; consequently, a substantial deficit on current account exists for 1973 and 1980 and, indeed, has existed for many years. Traditionally, this deficit has been offset by a larger surplus in the long-term capital account so that the reserves of foreign currency (the international liquidity) of the country has increased. In certain years, as in 1976 and in 1982, substantial short-term outflows have resulted in a loss of foreign reserves. The long-term capital flows for Mexico are classified by public and private sector. On a net basis, the public sector predominated in 1973 and 1980, with new debt substantially exceeding debt repayment.

In Mexico merchandise imports are financed by merchandise exports, particularly oil in recent years. In 1980, however, when oil sales were 65 percent of merchandise exports, merchandise exports could only finance 82 percent of merchandise imports, leaving a gap of \$3.27 billion. Despite the financing of part of this gap by current account surpluses in tourism, border transactions, and border assembly plants, new public debt remained an important means of financing merchandise import surpluses in the early 1980s, and Mexico has to finance new debt at higher interest rates and in the face of greater concern by foreign banks because of the already high debt and the current inflation, recession, and devaluation.

Two indicators of the overall importance of the foreign sector in the economy are the ratios of

exports to GDP and of debt to GDP. The first ratio indicates the proportion of the nation's resources devoted to the production of export items and the second shows foreign claims against domestic output as a proportion of current output—an indicator of the country's ability to carry debt. Oil has resulted in the increased importance of the

Table 2

Mexico's Direction of Merchandise Trade, 1973 and 1980

Category	1973		1980	
	Millions of dollars	Percentage of total	Millions of dollars	Percentage of total
Total exports	2,261	100.0	15,340	100.0
United States	1,318	58.3	9,688	63.2
Japan	147	6.5	563	3.7
West Germany	59	2.6	256	1.7
Spain	33	1.5	1,062	6.9
Other industrial countries	185	8.2	968	6.3
Developing countries	290	12.8	2,030	13.2
Communist countries	50	2.2	154	1.0
Not specified	180	8.0	618	4.0
Total imports	3,814	100.0	19,529	100.0
United States	2,277	59.7	12,814	65.6
Japan	178	4.7	1,039	5.3
West Germany	279	7.3	1,021	5.2
Other industrial countries	698	18.3	2,984	15.3
Developing countries	359	9.4	1,040	5.3
Communist countries	23	0.6	269	1.4
Not specified	—	—	363	1.9

Source: Calculated from data in International Monetary Fund, *Direction of Trade Yearbook*, 1981, pp. 265-66.

Table 3

Mexico's Net Balance of Payments, 1973 and 1980
(In millions of dollars)

Category	1973	1980
Current account		
Merchandise account	-1,743	-3,265
Tourism	466	659
Border assembly plants	278	773
Border transactions	513	605
Repatriated profits and interest	-907	-4,838
Transfers	n.a.	268
Other*	215	-798
Net current account balance	-1,175	-6,597
Long-term capital		
Arranging new debt and placing bonds†	1,962	7,771
Debt repayment‡	-864	-3,712
Net public sector balance	1,098	4,059
Direct foreign investment	287	963
Purchases of foreign businesses	-22	-10
Foreign claims	324	1,287
Security operations	-10	-117
Net private sector balance	579	2,123
Long-term capital account balance§	1,676	6,182
Short-term capital and errors and omissions	-378	1,566
Change in the reserves of the Banco de México**	123	1,151

*Includes net flows associated with nonmonetary gold and silver shipments and transportation services.

†Includes government and other public debt.

‡Includes a small amount of other net foreign credit.

§Equals the sum of the net public sector balance and the net private sector balance.

**Equals the sum of net current account balance, long-term capital account balance, and short-term capital and errors and omissions.

Source: Banco de México, *Informe anual*, 1974, p. 81; 1980, p. 176.

the foreign sector as exports have risen from less than 10 percent of GDP in the mid-1970s to 14 percent in 1981 (see table 4). The debt-to-GDP ratio doubled from 11 percent in the early 1970s to 23 percent in 1981, although the latter figure represents a fall from a high of 34 percent in 1977. In absolute terms, the public debt was \$49 billion at the end of 1981. In addition, private debt was estimated at \$15 billion at the end of 1981.⁸ In September 1982, public foreign debt had risen to about \$60 billion and private foreign debt had climbed to \$20 billion.⁹ Thus, the 1982 ratio of debt to GDP will show a significant growth over 1981.

The secretary of finance announced in May 1982 that the Mexican government would borrow \$25 billion to \$28 billion in 1982, \$11 billion of which would finance an anticipated balance-of-payments deficit and \$14 billion to \$17 billion would refinance maturing debt.¹⁰ Upon instituting the currency controls, the government announced that its reserves of foreign currency were virtually depleted. A ninety-day suspension of principal payments on foreign debt was already in effect, but the government has pledged to honor its international commitments and, in September 1982, was seeking large emergency loans from such international agencies as the Bank for International Settlements (\$1.68 billion) and the International Monetary Fund (\$4.5 billion).¹¹ The heavy debt, the devaluation, and the recession in Mexico in 1982 has put some of Mexico's largest companies in a shaky financial position.¹² Mexico is said to have now passed Brazil as the leading debtor among developing nations. Aside from 1981-1982 developments that may be attributed partially to falling oil prices, Mexico was carrying a higher debt-to-GDP ratio than it was in the immediate period before the development of new hydrocarbon deposits. Mexico intended to finance a payments

deficit with debt rather than attempting to eliminate it with an even more rapid expansion of oil exports.

The current account deficit was 44 percent of exports of goods and services in 1981. This ratio indicates the extent to which imports exceed exports of goods and services and, hence, the gap that must be closed by a surplus in the capital account. This ratio averaged only 26 percent in the previous four years of oil expansion, down from the 53 percent average of 1974-1976 and on a par with the 1971-1973 average of 27 percent. The jump to 44 percent in 1981 reflects not only the shortfall in oil revenues associated with the drop in sales and in prices, but also the rising interest changes, as interest rates rose, on the public debt. As petroleum has risen in importance as an earner of foreign exchange, tourism has dropped from 40 percent of foreign exchange in the early 1970s to about 23 percent in 1980 and, probably, to even less in 1981, as the peso became more and more overvalued. On the other hand, Mexican tourism has risen as a user of foreign exchange. Interest and service payments on debt have also risen dramatically as users of foreign exchange; in 1979 interest accounted for 18 percent of foreign exchange earnings and service payments accounted for 66 percent. These percentages probably remained high and doubtless have increased in 1980 and 1981 when both foreign debt and interest rates were rising. The growth in interest and amortization payments has occurred since extensive oil exports began.

Overall payment surpluses add to international reserves, a measure of the liquidity of Mexico's foreign sector, and payment deficits subtract from them. Capital account surpluses have exceeded current account deficits since 1970; international reserves have been added to every year except 1976, when a short-term capital flight associated with a

Table 4
The Mexican Economy Related to Foreign Sector Performance, 1970-1981

Year	Billions of current dollars				As percentage of GDP**		As percentage of exports**					Annual growth rate of GDP deflator††	
	GDP*	Debt†	Exports‡	Reserves§	Debt	Exports	Tourism	Petroleum	Interest	Debt service	Reserves		Deficit
1970	33.5	3.8	2.9	0.6	11.3	8.6	40.9	—	7.6	24.2	19.8	37.3	4.5
1975	79.1	13.8	6.3	1.4	17.5	7.9	34.7	7.0	13.3	25.5	22.1	64.8	16.7
1979	119.9	36.0	15.8	2.0	30.0	13.2	25.7	24.0	18.2	65.5	12.9	28.7	20.2
1980	166.1	41.0	23.6	2.8	24.7	14.2	22.7	41.9	n.a.	n.a.	12.0	28.0	28.7
1981	210.7	49.0	30.1	5.0	23.3	14.3	n.a.	47.8	n.a.	n.a.	16.7	43.6	28.5

*Exchange rates used to convert peso to dollar GDP. International Monetary Fund, *International Financial Statistics Yearbook*, 1980, pp. 293, 295. *IFS Yearbook*, June 1982, pp. 282, 284. Peso GDP extended forward to 1980 using percentage changes in revised series and to 1981 using 7 percent real GDP increase and 28.5 percent price increase reported in Banco Nacional de México, *Review of the Economic Situation of Mexico*, December 1981, p. 377.

†End-of-year external public debt outstanding, with a maturity of one year or more, repayable in foreign currency by public bodies. Data include private sector debt guaranteed by public institutions. Inter-American Development Bank, *Economic and Social Progress in Latin America*, 1980-1981, p. 312, 438. *Review of the Economic Situation of Mexico*, December 1981, p. 378.

‡Exports of goods and services calculated from data on debt service payments in millions of dollars and as a percentage of goods and services in IDB 80/81, pp. 442-43. 1980 is current account inflows less transfers and less income received by Mexican residents from assets abroad from *Informe anual*, 1980, p. 176; 1981 from *IFS Yearbook*, June 1982, p. 284.

§International reserves do not include gold at national valuation, which rose from \$176 million to \$853 million from 1970 to 1980. It does include SDRs, but the major element is foreign exchange holdings, which rose from \$385 million in 1970 to \$2,560 million in 1980. Changes in foreign exchange holdings reflect balance-of-payments surpluses or deficits. *IFS Yearbook*, 1981, p. 299; 1981 reported by Jesus Silva, treasury secretary of Mexico, in *Wall Street Journal*, June 2, 1982, p. 26.

**Tourism includes border transactions. Debt service is interest plus amortization. Deficit is current account deficit. All percentage data were calculated from data in millions of current dollars. Data are from IFS, IDB, and *Informe anual*.

††Calculated from data in *IFS Yearbook*, 1981, p. 301, and *IFS Yearbook*, June 1982, p. 284; 1981 data from *Review of the Economic Situation of Mexico*, December 1981, p. 377.

devaluation scare occurred, and during the 1981–1982 crisis when extensive capital flight again occurred. In June 1982 the finance secretary reported Mexican reserves to be at \$3.9 billion, down from \$5 billion at the end of 1981, and by September 1982 Mexican reserves of foreign exchange had been virtually depleted.¹³ As a percentage of exports, international reserves fluctuated between 20 percent and 26 percent during the 1970–1975 period, fell to 17 percent in 1976, recovered to 21 percent in 1977, and fell again to 12 percent in 1980.

The remaining important development in the foreign sector is related principally to changes in the exchange rate and in domestic inflation. The peso was floated in 1976 and fell rapidly from 12.5 pesos to the dollar. By the beginning of 1977, it had settled at about 22.5 pesos to the dollar. It was supported at that level until 1980 when again it was allowed to slip gently down. It had reached about 27 pesos to the dollar when it was floated on February 17, 1982. In early August 1982, the peso was about 49 to the dollar. On August 6, 1982, support was again withdrawn and the peso fell to 125 to the dollar by the end of the month. Domestic inflation accelerated from 4 percent to 6 percent in 1970–1972 to 12 percent in 1973 to 24 percent in 1974. The rate dropped to 17 percent to 20 percent in 1975–1976, and, after the 1977 devaluation, was at 30 percent. In 1978–1979, the rate dropped again to 17 percent to 20 percent but in 1980–1981 it again ran at nearly 30 percent. Following the 1982 devaluations, the expected inflation rate for 1982 is expected to be about 100 percent. Since 1973, Mexico's inflation has run far in excess of the U.S. rate.

Theory predicts Mexican net exports to be inversely related to the exchange rate, defined as dollars to the peso; to be directly related to the ratio of domestic to foreign price levels; to be inversely related to domestic real income; and to be directly related to foreign real income. Important determinants of capital outflows include the Mexican price level, relative Mexican and foreign interest rates, and expectations of future exchange rates. Together, these factors determine an exchange rate that clears the market in the sense that net current account inflows are exactly offset by capital outflows. (Conversely, net current account outflows are exactly offset by capital inflows.) In the long run, the relation between relative prices and exchange rates appears to be so strong that when a country accepts a certain trend rate of relative inflation the trend growth in the exchange rate in relation to other countries is implied. From the beginning of 1973 to the beginning of 1982, Mexican prices relative to U.S. prices rose by a factor of three. On February 18, 1982, the day after the float, the peso sold at 37.50 to the dollar, exactly three times the rate in 1973. The abnormally high rate of inflation that occurred immediately after the 1976 devaluation and seems to be occurring now may be an adjustment to a sudden increase in the price of imported inputs. In any case, if Mexican inflation continues to be high, the value of the peso must continue to go down.

It should also be noted that as a result of shortfalls in oil revenues, the increased debt burden caused by high interest rates, and inflation following the devaluation in February, the government had to cut back expenditures and planned

growth rates in February and April 1982.¹⁴ Since February, the financial problems have deepened, resulting in the August 6 devaluation and the September 1 announcement of the suspension of convertibility and the nationalization of private banks. Economic activity has slowed so much that no economic growth is predicted for 1982; growth rates for the past three years were 7 percent to 9 percent. Most observers now believe that Mexico was attempting an unrealistic rate of expansion and must cut back.

Developments in the foreign sector are conditioned by policy decisions of Mexico and her trading partner. The basic Mexican restrictions on import trade were relaxed a little in 1979–1981 but were strengthened again in 1982. The fear of losing control may be the major factor behind Mexico's reluctance to enter the General Agreement of Tariffs and Trade (GATT). In 1974 the Generalized System of Preference of the U.S. Trade Act exempted developing nations from U.S. import duties on many products, but, through 1978, Mexican exports appear to have been helped little by this provision.

In November 1980 José Andres de Oteyza, secretary of natural resources and industrial development, announced a formal codification of decisions affecting petroleum.¹⁵ The most important decisions were that Mexico would not exceed oil exports of 1.5 million barrels a day in the foreseeable future, Mexico would diversify with almost all the allowable increase going to countries other than the United States, the capital goods used in the expansion of petroleum industry capacity would be produced in Mexico, and protectionist trade policies and import substitution would be continued. These energy policies were embodied in the long-term Global Development Plan. (The principal architect of the plan was Miguel de la Madrid, who was then the secretary of programming and budget and is now the president-elect of Mexico.) Financing of the current account deficit partially through increased oil exports and heavily through growing foreign debt also appeared to be a conscious policy choice. Oil is also being used to finance the importation of technology from such countries as Japan, Canada, and Sweden.

The governmental decision not to try to finance expanded imports completely through expanded oil revenues, but rather to continue significant debt financing, may have resulted partially from an unwillingness to bear the cost of the economic and sociopolitical stresses of an even more rapid expansion of the industry. It may have also meant that policymakers believed that the oil exported in the future would earn foreign exchange in excess of that needed to repay loans plus interest. In any case, the oil sale arrangements and the development of the industry may well violate policy pronouncements. Certainly, it is wise to manage exports of oil, but only future economic realities can determine the extent to which they should be limited and to whom they should be directed. Thus, policy must be flexible to allow for unforeseeable developments.

The devaluation in 1976 probably corrected payments problems temporarily, and those in 1982 might have done so had capital flight not depleted reserves. Regardless of

developments in oil sales, however, the peso had to continue to fall so long as relative inflation continued. If convertibility is reestablished, the new peso value will have to reflect the new relative price levels determined by the relative inflation that occurred since convertibility was dropped. Despite the problems in the foreign sector during 1981-1982, the Mexican economy has the basic strengths of a strong resource base and a significant accumulation of physical and human capital that provide the basis for recovery and continuing steady growth.

Notes

1. *Wall Street Journal*, September 2, 1982, p. 3.
2. Banco Nacional de México, *Review of the Economic Situation of Mexico*, September 1981, p. 303, and U.S. Department of Energy, *1980 International Energy Annual*, p. 82.
3. *Latin America Weekly Report*, May 28, 1982, p. 5, and *Wall Street Journal*, September 7, 1982, p. 2.

4. Banco Nacional de México, *Review of the Economic Situation of Mexico*, December 1981, p. 407.
5. *Latin America Weekly Report*, April 9, 1982, p. 3.
6. All real data were calculated by deflating current dollar data by the U.S. GNP price deflator. *Economic Report of the President, 1982* (Washington, D.C.: Government Printing Office, 1982) p. 236.
7. Data for 1981 are from Banco Nacional de México, *Review of the Economic Situation of Mexico*, December 1981, p. 407.
8. *Ibid*, p. 378.
9. *Wall Street Journal*, September 7, 1982, p. 1.
10. *Latin America Weekly Report*, April 9, 1982, p. 3.
11. *Wall Street Journal*, September 2, 1982, p. 3, September 7, 1982, pp. 1 and 19, and September 9, 1982, p. 2.
12. See, for example, report on problems of Grupo Industrial Alfa, S.A., in *Wall Street Journal*, June 18, 1982, p. 23, and *Business Week*, August 2, 1982, p. 55.
13. *Wall Street Journal*, June 2, 1982, p. 26, and September 2, 1982, p. 3.
14. *Latin America Weekly Report*, May 14, 1982.
15. *Mexican-American Review*, January 1981.

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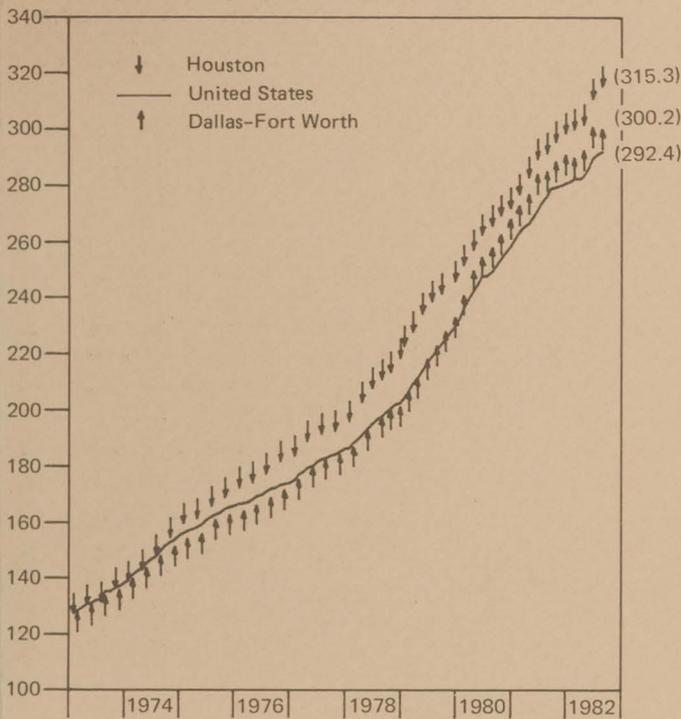
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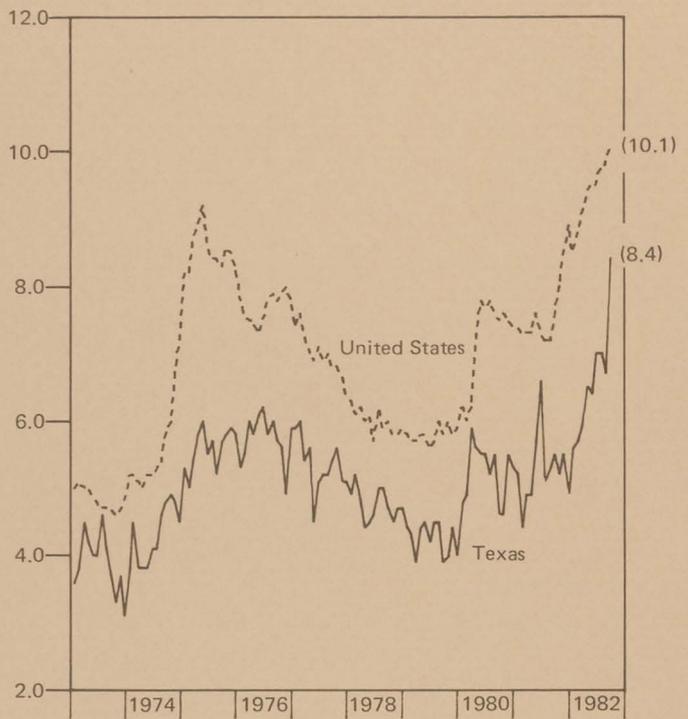
(All figures are for Texas unless otherwise indicated.)

All graphs except the one for nonagricultural employment are adjusted for seasonal variation. Data were compiled from the following sources: U.S. Department of Labor, Texas Employment Commission, Texas Railroad Commission, and Federal Reserve Bank. Data on oil refining are current through June 1982; data on total industrial production are current through July 1982; data on unemployment are current through September 1982; all other data are current through August 1982.

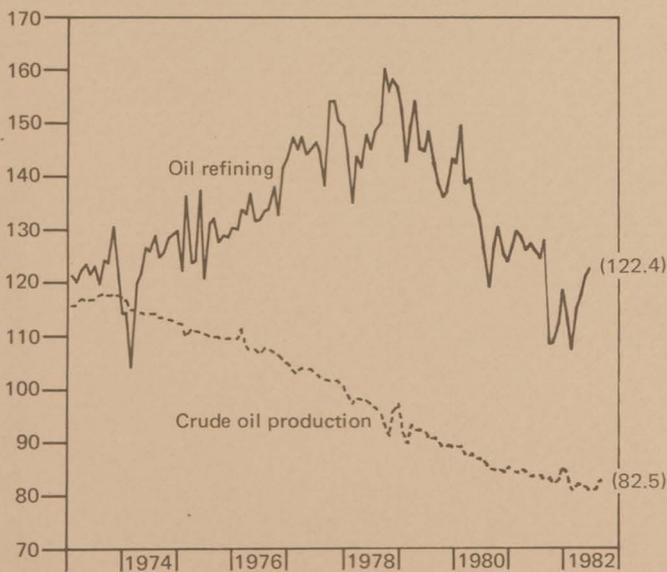
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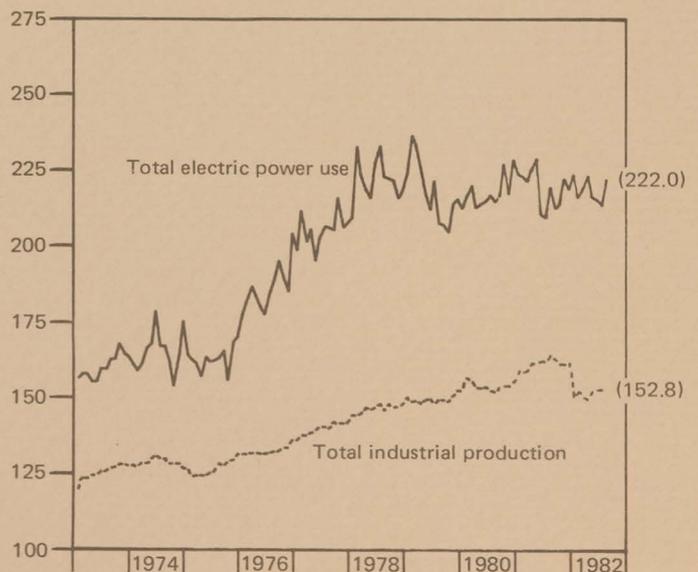
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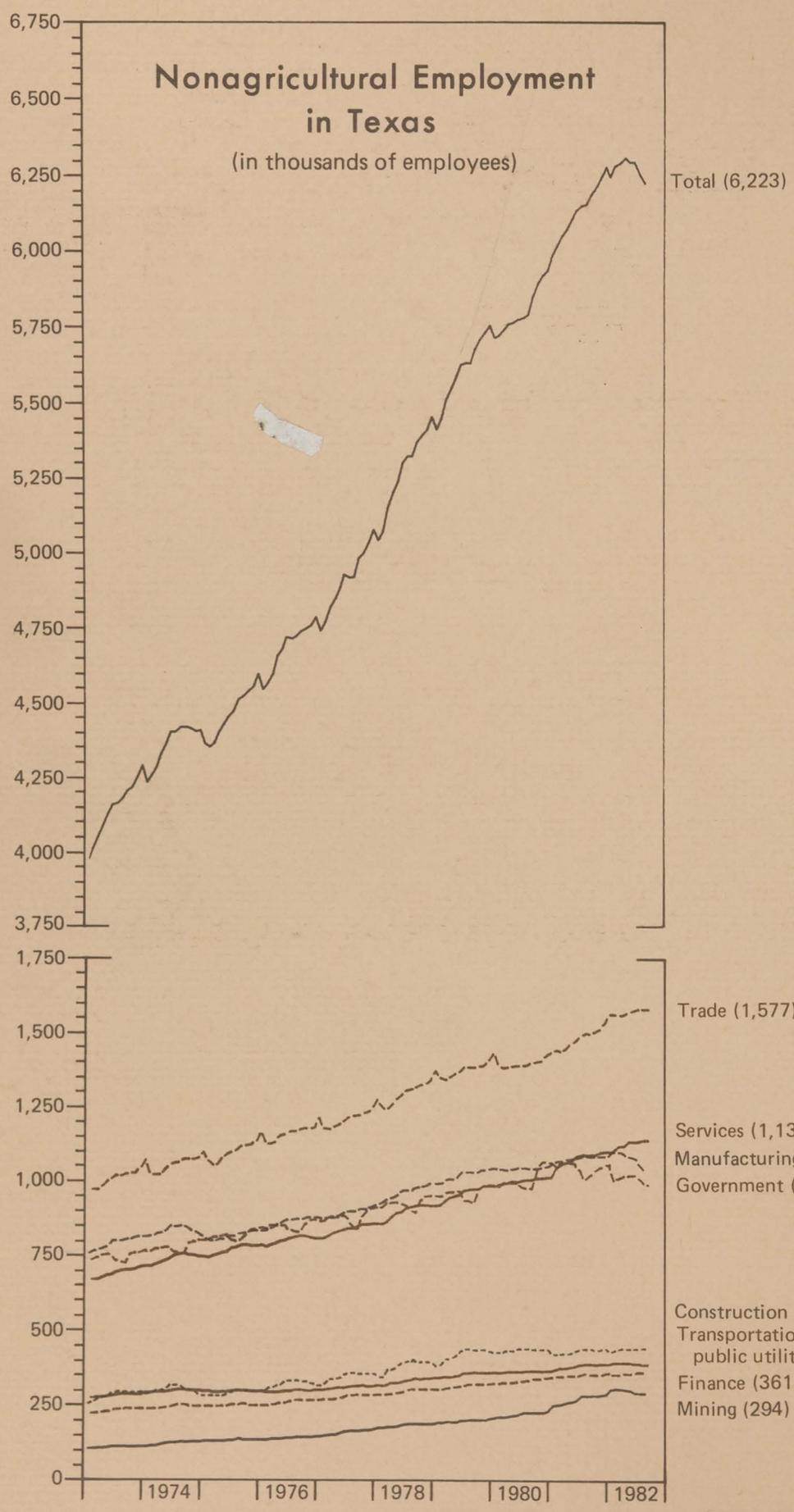
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Industrial Activity (Index: 1967=100)



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