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THE BUSINESS SITUATION IN TEXAS

John R. Stockton

Texas business activity surged upward in August after an erratic decline in July, continuing the strong rise that has been characteristic of the economy throughout most of 1972. The index of Texas business, based on the volume of checks drawn against demand deposits, rose 8 percent in August, restoring practically all of the loss registered in July. This rise in the measure of total business activity corresponds with the behavior of practically all of the barometers of business in the state.

An analysis of the major indicators of Texas business suggests that the decline in July was not a reversal of the trend of business but was due to a combination of circumstances related to the calendar. July 1972 had five Saturdays and five Sundays, which inevitably depressed the total figures on business. In addition to an extra weekend, the Independence Day holiday came on Tuesday, with the result that businesses were inclined to take a two-day holiday. No adjustment in the total figures for the month of July was attempted and it seems logical to conclude that activity actually remained high throughout the summer months.

On the national scene, gross national product for the first half of 1972 rose 11.4 percent, and after allowance for the increase in prices, it rose 9.4 percent. Even if the rise in gross national product does not maintain this rate of increase for the remainder of the year, 1972 gives promise of showing the strongest recovery that has occurred since the decline ended in December 1970.

Personal consumption expenditures, the largest component of the gross national product, rose 14 percent between the last quarter of 1970 and the second quarter of 1972. Retail sales in Texas for the first seven months of 1972 were 12 percent above the same period of 1971. The only figures available for August at this time, retail sales in department stores in the eleventh Federal Reserve District, show an increase of 11 percent over a year ago.

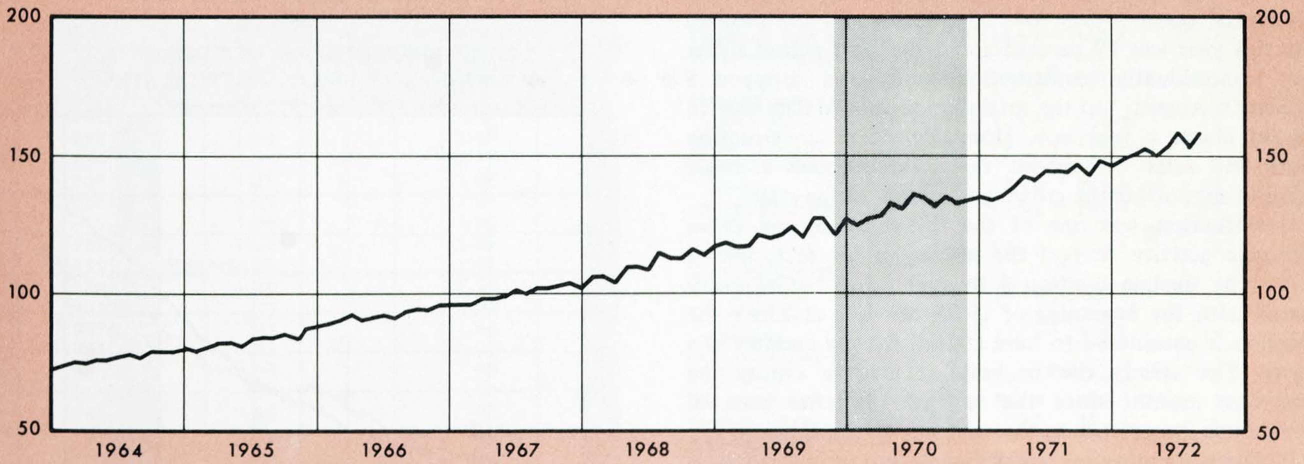
The rise in consumer spending results partly from the increase in disposable income, partly from a reduction in the percentage of income saved. In the second quarter of 1972 the percentage of disposable income saved was 6.4, in comparison with 8.6 in the second quarter of 1971. The shift from savings to consumer spending is a significant feature of the recent level of business, and nothing indicates that this tendency to spend will be reduced in the immediate future.

Although consumer spending is the largest segment of the gross national product, one of the most strategic segments is spending for capital goods. This category includes expenditures for increased inventory, investment in new plant and equipment, and construction of residential and nonresidential buildings. Money spent for these purposes stimulates business activity by increasing wages of consumers as well as by providing all kinds of businesses supplying capital goods with increased business volume.

Information on capital spending by Texas firms is not available, but since the industry of the state is growing somewhat faster than that of the country as a whole, national figures give significant information. Expenditures for the second quarter of 1972 for the United States were

ESTIMATED PERSONAL INCOME, TEXAS

Index Adjusted for Seasonal Variation — 1967=100



SOURCE: Quarterly measures of Texas personal income made by the Office of Business Economics, U.S. Department of Commerce. Monthly allocations of quarterly measures, and estimates of most recent months, made by the Bureau of Business Research with regression relationships of time, bank debits, and insured unemployment.

NOTE: Shaded areas indicate periods of decline of total business activity in the United States.

INDEXES OF CONSUMER PRICES U.S. AND DALLAS, TEXAS (1967 = 100)

Classification	Aug 1972	Percent change: Aug 1972 from Jul 1972	Percent change: Aug 1972 from Aug 1971
All items			
United States	125.7	0.2	2.9
Dallas, Texas	125.5	...	2.3
Food			
United States	124.6	0.3	3.8
Dallas, Texas	123.7	...	3.5
Housing			
United States	129.9	0.3	3.8
Dallas, Texas	128.6	...	2.1
Apparel and upkeep			
United States	120.8	− 0.3	1.5
Dallas, Texas	121.6	...	1.8
Transportation			
United States	120.5	0.2	1.0
Dallas, Texas	121.4	...	1.3
Health and recreation			
United States	126.5	0.2	2.8
Dallas, Texas	127.3	...	2.2

... Data for July not available.
Source: Bureau of Labor Statistics, U.S. Department of Labor.

15 percent above the level of the last quarter of 1970. Reports from business concerns indicate that expenditures for the second half of 1972 should approximately equal those for the first half. This segment of the economy should continue to give strong support to Texas business for the remainder of the year.

Construction, both residential and nonresidential, continues to offer strong support to total economic activity. After a sudden erratic drop in July construction authorized in Texas, the August value of new building authorized rose 14 percent from July, bringing the total for the year to a level 22 percent above the first eight months of 1971. Residential construction rose 35 percent and the total to date this year was 19 percent above the same period a year ago. Nonresidential construction authorized dropped 5 percent in August, but the total for the year to date was 26 percent above a year ago. Money spent on construction wages and sales throughout the state becomes a major factor in supporting the growing economy of the state.

Construction was one of the first elements of Texas economic activity to feel the effects of the recession of 1970. The decline continued through 1969 but recovery started with the beginning of 1970, the date at which the recession is considered to have started for the country as a whole. The steady rise in building activity during the thirty-two months since the end of 1969 has been of tremendous importance to the economy of the state.

Business spending for the accumulation of inventories is similar to spending for buildings and equipment in its effect on the total economy. In spite of some increases in inventories, this segment of private domestic investment has not been as stimulating to business as other types of capital

TOTAL UNEMPLOYMENT, TEXAS

Index Adjusted for Seasonal Variation—1967=100

SOURCE: Texas Employment Commission. Data adjusted for seasonal variation by the Bureau of Business Research.
NOTE: Shaded areas indicate periods of decline of total business activity in the United States.

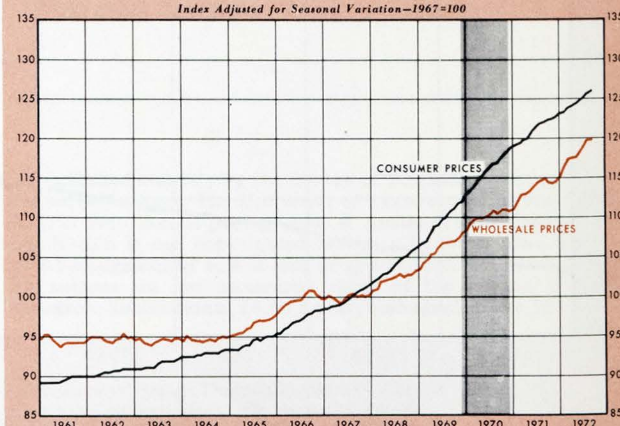
expenditures. In May the largest increase of the current recovery was registered, but even this increase of $1,200,000 was only .6 percent of the previous month. In the twelve-month period ending July 31, 1972, inventories of all business concerns were approximately 4 percent higher than a year earlier. This rise is considered rather small in light of the strengthening demand being registered in business, and rising interest rates and talk of tighter credit may be causing businessmen to be cautious in building stocks of goods. Some analysts had hoped for a yearly increase in the neighborhood of twice that recorded. Another factor causing the small increase in inventories may be the extremely low level of inventories of automobile dealers. This has been an unusually good year for sales of automobiles, so the low level of these inventories is a sign of exceptionally good business.

Employment in Texas has continued to increase; total nonagricultural employment in August was 3.1 percent higher than a year earlier. Manufacturing employment rose 1.7 percent and nonmanufacturing employment, 3.4 percent. Unemployment in the civilian labor force averaged 4.0 percent for selected labor-market areas but ranged from 2.6 percent in Austin to 9.2 percent in Laredo. For the state as a whole, unemployment was 3.8 percent.

Weekly earnings of labor in manufacturing have risen from $136.85 in August 1971 to $143.85 a year later. This increase has resulted partially from an increase in average

COMPARISON OF CONSUMER PRICES AND WHOLESALE PRICES, UNITED STATES

Index Adjusted for Seasonal Variation—1967=100



SOURCE: Bureau of Labor Statistics, U.S. Department of Labor.
NOTE: Shaded areas indicate periods of decline of total business activity in the United States.

weekly hours worked from 40.7 to 41.1 in the period of a year. At the same time that the number of hours worked was rising, average hourly earnings rose from $3.36 to $3.50.

Texas industrial production fell from 133.0 in July to 131.4 in August, but was 8.7 percent above the level of 120.9 in August 1971. The index of industrial production for the United States rose more strongly in August than in any other recent month, registering 114.3 in comparison with 113.7 in July. The August index was 8.2 percent higher than a year ago, but much of this increase is the result of recovery from the slump in steel production last summer. This tends to exaggerate the real rise in production, although the rise has been substantial.

The improvement shown in the Texas indexes is uniformly good; there exists little doubt that the recovery from the recent recession is real. The threat of inflation, however, is also real. An accompanying table shows the decline in the purchasing power of the dollar since 1950. If one determines the amount of goods and services that could be bought for $1.00 in 1960, one will find that this same dollar will buy only $.71 worth of goods at present prices.

PURCHASING POWER OF THE DOLLAR
(As measured by U.S. Bureau of Labor Statistics Index of Consumer Prices, 1960=100)

Year	United States*	Houston, Texas
1950	1.23	1.19
1951	1.14	1.10
1952	1.12	1.09
1953	1.11	1.08
1954	1.10	1.08
1955	1.11	1.08
1956	1.09	1.07
1957	1.05	1.04
1958	1.03	1.02
1959	1.02	1.01
1960	1.00	1.00
1961	.99	1.00
1962	.98	.98
1963	.97	.97
1964	.96	.95
1965	.94	.94
1966	.91	.92
1967	.89	.89
1968	.85	.86
1969	.81	.80
1970	.76	.76
1971	.73	.74
1972	.71	.72

* U.S. city average.

Furthermore, that same dollar would have bought $1.23 worth of goods in 1950. Thus since 1965 the purchasing power of a 1960 dollar has dropped by 22 percent from $.91 to $.71. Between 1965 and August 1972, however, hourly wages in manufacturing in Texas increased from $2.48 to $3.50, or 41 percent. The worker in manufacturing has increased his pay more than the purchasing power of his pay has decreased.

Controls have worked more effectively on prices—food prices being an exception—than they have on wages. Controls, however, obviously are creaking and groaning, and there exists some doubt that they will continue to hold. Inflationary pressures are growing stronger as business conditions improve. The federal deficit for fiscal year 1973 appears to be headed for $30 to $35 billion, in comparison with $23 billion at the end of the fiscal year ended July 1, 1972. Since this deficit is met by issuance of government securities, the deficit measures the amount of new purchasing power that is released to the market to increase the demand for goods and services. The inevitable result is that the prices of goods and services will continue to rise.

One important step in reducing the inflationary pressure would be the reduction of the federal deficit either by increasing taxes or by reducing expenditures. From a political standpoint either measure seems impossible. The fiscal policy of the federal government can be used to

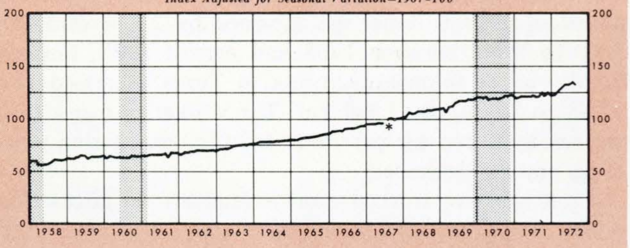
SELECTED BAROMETERS OF TEXAS BUSINESS
(Indexes—Adjusted for seasonal variation—1967=100)

Index	Aug 1972	Jul 1972	Year-to-date average 1972	Percent change: Aug 1972 from Jul 1972	Percent change: Year-to-date average 1972 from 1971
Estimated personal income	157.3^{p}	153.3^{p}	152.8	3	9
Business activity	171.9	159.8	163.2	8	10
Crude-petroleum production	112.1^{p}	121.8^{p}	115.0	− 8	3
Crude-oil runs to stills	116.9	116.1	115.5	7	2
Total electric-power use	151.8^{p}	149.1^{p}	151.7	2	12
Industrial electric-power use	137.3^{p}	135.6^{p}	138.3	1	10
Bank debits	206.1	191.3	192.8	8	15
Urban building permits issued	177.9	158.6	183.8	12	20
New residential	216.3	160.3	203.0	35	19
New nonresidential (unadjusted)	148.3	156.6	170.2	− 5	26
Total industrial production	131.4^{p}	133.0^{p}	129.4	− 1	7
Total nonfarm employment	115.9^{p}	115.7^{p}	115.5	**	2
Manufacturing employment	108.3^{p}	107.3^{p}	108.4	1	1
Total unemployment	155.8	152.4	153.3	2	− 9
Insured unemployment	172.0	179.3	172.6	− 4	− 18
Average weekly earnings—manufacturing	129.4^{p}	129.2^{p}	128.7	**	6
Average weekly hours—manufacturing	98.7^{p}	98.9^{p}	98.9	**	1

^{p} Preliminary.
** Change is less than one half of 1 percent.

INDUSTRIAL PRODUCTION, TEXAS

Index Adjusted for Seasonal Variation—1967=100



*After July 1967 the plotted Texas Industrial Index is computed on a reweighted base which incorporates additional data; prior to this time the original index is graphed, its base period having been updated from 1957-1959 to 1967.
NOTE: Shaded areas indicate periods of decline of total business activity in the United States.
SOURCE: Federal Reserve Bank of Dallas.

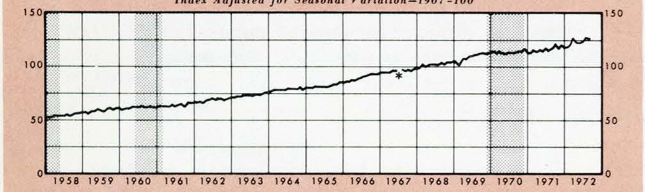
INDUSTRIAL PRODUCTION
DURABLE MANUFACTURES, TEXAS

Index Adjusted for Seasonal Variation—1967=100

*After July 1967 the plotted Texas Industrial Index is computed on a reweighted base which incorporates additional data; prior to this time the original index is graphed, its base period having been updated from 1957-1959 to 1967.
NOTE: Shaded areas indicate periods of decline of total business activity in the United States.
SOURCE: Federal Reserve Bank of Dallas.

INDUSTRIAL PRODUCTION
NONDURABLE MANUFACTURES, TEXAS

Index Adjusted for Seasonal Variation—1967=100



*After July 1967 the plotted Texas Industrial Index is computed on a reweighted base which incorporates additional data; prior to this time the original index is graphed, its base period having been updated from 1957-1959 to 1967.
NOTE: Shaded areas indicate periods of decline of total business activity in the United States.
SOURCE: Federal Reserve Bank of Dallas.

increase demand by placing more purchasing power in the hands of businessmen and the public, or it can be used to reduce the amount of purchasing power. Whether this can be done in our political framework is debatable.

One group of economists believes that inflation is the result of an increase in the supply of money. The Federal Reserve Board has the power to reduce the supply of money in circulation, which consists chiefly of currency and demand deposits in the banks. The device it uses to accomplish that is reduction of the amount of credit issued by banks, hence reduction of the amount of their deposits. But exercise of this power to reduce the amount of bank credit available would jeopardize expansion of business. No one wants to bring on a decline in business activity with the resultant increase in unemployment. Any elected government quite likely would run the risk of inflation in preference to slowing down business activity and reducing the number of jobs.

The steady increase in business activity seems to set the stage for a resumption of the growth in the economy that has been underway since 1961 with only a minor setback in 1970. Economists generally agree that the economy started to move upward in December 1970, although the recovery has been sluggish until recent months. Business expansion, which has been financed largely by cash flow from operations, is solidly based. Profit margins are widening as labor costs per unit of output have tended to stabilize.

Despite an apparently rosy picture, investors are worried about the prospects of higher interest rates. The behavior of the stock market has not been encouraging, even though no one believes that the Federal Reserve Board will bring on another credit crunch. For the past six months the supply of money has been allowed to increase above the rate needed to maintain a steady growth in the economy.

We appear to be in the strange position of worrying about the good news for fear that it will bring about more inflation, and at the same time worrying for fear that employment will fail to rise enough to supply jobs to the growing labor force.

The consensus of forecasts by business economists seems to be that 1973 will continue to show improvement of the present level of business. Gross national product is expected to increase approximately 10 percent over 1972, but adjustment for the rise in prices may cut this increase to about 6 percent. Corporation profits are expected to continue to improve, industrial production will increase by as much as 6 percent over 1972, and the Dow Jones index of common stock prices will show a moderate increase. Unemployment is expected to remain between 5 and 6 percent of the labor force, and at the same time the consumer price index is expected to rise between 3 and 4 percent. Regardless of who wins the election, no drastic change is expected to occur in the trends that were in evidence at the beginning of autumn 1972.

BUSINESS-ACTIVITY INDEXES
FOR TWENTY SELECTED TEXAS CITIES
(Adjusted for seasonal variation—1967=100)

City	Aug 1972	Jul 1972	Year-to-date average 1972	Percent change: Aug 1972 from Jul 1972	Percent change: Year-to-date average 1972 from 1971
Abilene	127.9	119.7	121.8	7	10
Amarillo	161.1	140.5	144.4	15	15
Austin	225.9	204.4	218.2	11	13
Beaumont	101.5	93.7	98.4	8	2
Corpus Christi	159.5	145.8	153.9	9	12
Corsicana	136.9	118.0	123.7	16	3
Dallas	176.0	166.0	171.2	6	6
El Paso	174.2	153.6	154.1	13	11
Fort Worth	166.1	150.4	157.1	10	4
Galveston	123.7	103.9	114.4	19	– 5
Houston	178.4	167.9	168.1	6	18
Laredo	171.5	160.7	155.4	7	6
Lubbock	137.4	119.0	132.6	15	9
Port Arthur	100.2	100.2	101.2	**	– 18
San Angelo	148.2	149.0	151.9	– 1	8
San Antonio	158.5	147.3	151.5	8	4
Texarkana	118.3	115.3	115.8	3	10
Tyler	158.5	133.8	136.4	18	9
Waco	176.3	148.0	153.4	19	14
Wichita Falls	124.9	123.7	123.3	1	9

** Change is less than one half of 1 percent.

THE OUTLOOK FOR SULFUR*

Jared E. Hazleton**

Sulfur is one of the most plentiful of the elements, but twice in the period since World War II it has been in tight supply both within the United States and abroad. In 1952 the Paley Commission identified sulfur as one of the materials that would be in short supply and urged that efforts be made to conserve sulfur, particularly sulfur contained in sour natural and refinery gases. Ten years later, sulfur prices were at an all-time low and the industry faced a serious oversupply situation. Twice within the next ten years, the sulfur supply and demand situation turned around completely, moving suddenly into shortage in 1964 and returning to a condition of oversupply in 1969.

Sulfur provides an excellent example of the close relationship between market forces and the expansion of the resource base. In this paper, I shall review the demand and supply situation for sulfur, attempting to identify those factors that will influence sulfur markets over the remaining years of this century.

Demand for Sulfur

With the exception of its direct application as a plant nutrient, sulfur enters into various processing and manufacturing industries as a raw material or factor of production. Over 85 percent of the brimstone consumed within the United States is burned to form sulfur dioxide for conversion to sulfuric acid. Thus the demand for sulfur is dependent largely upon, or derived from, the demand for the end products of industries that consume sulfur either directly or in the form of sulfuric acid.

The relative importance of the various end uses for sulfur in acid and nonacid forms is indicated in Table 1, where domestic sulfur consumption is broken down by major industry. The demand curve for sulfur, as an intermediate product, depends upon four factors: (1) the technology, i.e., both the marginal rate of substitution between sulfur and alternative factors, and the relationship between marginal physical product and changes in sulfur input; (2) the nature of demand for the firm's products; (3) the prices of other factors; and (4) the elasticity of supply of other factors employed.

The marginal rate of substitution between sulfur and other factors is relatively high in such industries as chemical fertilizers, paint and pigments, petroleum, iron and steel, and pulp and paper, where technically and economically feasible substitutes exist. The marginal rate of substitution is relatively low in the nonferrous metals, rayon, and rubber industries, where substitutes are technically inferior to sulfur or sulfuric acid. Thus the elasticity of demand for sulfur would be higher for firms in the first group of industries than for firms in the second group, given the time required for substitution to occur.

In most cases, sulfur as sulfuric acid is combined in almost fixed proportions with other inputs; thus the marginal physical product declines rapidly as additional units of sulfur are added. In most of its uses, sulfur represents only a small fraction of the total cost of the products. For example, 100 pounds of sulfur (costing about $1.00 today) are used in the production of 800 to 1,000 pounds of black powder, 2 to 2.5 tons of nitroglycerine, 100 to 125 pounds of viscose rayon, 5,000 pounds of soft rubber, and 885 to 1,060 pounds of superphosphate fertilizer. The fact that, in general, sulfur accounts for only a small fraction of the total cost of most of the products in which it is used, combined with the unlikelihood of substitution in the short run, supports the presumption that the demand for sulfur is inelastic in the short run.

In the long run, however, the demand for sulfur is probably elastic, at least over some range of prices. The continued use of sulfur as an industrial raw material is dependent to a large extent on how the price of sulfur and the costs of sulfur-consuming processes compare with the price of technical substitutes and the costs of processes employing those substitutes. Unique uses for sulfur are few. In most instances, technical substitutes are available. In addition, since several sources of sulfur exist, the demand for any single source (for example, Frasch sulfur) is more elastic than the demand for sulfur in general. Thus the possibility of substitution tends to make the long-run demand for sulfur relatively price-elastic.

However, a decision to use sulfur generally coincides with a decision to use a particular process. Thus the purchase decision has investment overtones. Changing from elemental sulfur to a technical substitute or to another form of sulfur generally will involve a change of processes, requiring both changes in input proportion of other raw materials and changes in plant and equipment. As price rigidity reduces the element of risk in a purchase decision with investment implications, purchasers of sulfur are felt to prefer a reliable source of sulfur at a reasonably stable price to widely fluctuating prices.

* Adapted from a paper presented to the Forum on Energy Resources and Plant Foods, sponsored by the National Materials Policy Commission, Washington, D.C., and The University of Texas at Austin, May 15-17, 1972. All papers given at the forum will be published in book form by the Bureau of Economic Geology of The University of Texas at Austin.

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Table 1

FORECASTS OF DEMAND FOR SULFUR (ALL FORMS) BY END USE, YEAR 2000
(Thousand long tons)

End use	Actual demand 1968	Demand in the year 2000 Low forecast	High forecast
Fertilizers	4,550	12,000	22,300
Inorganic pigments	500		
Cellulose fibers (rayon)	570	1,500	2,000
Nonferrous metals (ore leaching)	300	1,050	2,000
Explosives	250	700	1,050
Iron and steel pickling	200		20
Petroleum refining	180	325	530
Alcohols	135	400	500
Pulp and paper	540	800	1,000
Other uses	1,860	6,225	7,500
Total	9,085	23,000	37,000

Source: U.S. Department of the Interior, Bureau of Mines, *Mineral Facts and Problems*, 1970 edition, p. 1260.

Notes: Median projection, thirty million tons, for 2000 is identical to that made by Hans H. Landsberg, Leonard L. Fischman, and Joseph L. Fischer, *Resources in America's Future* (Baltimore: The Johns Hopkins Press for Resources for the Future, Inc., 1963), p. 486.

Estimated demand for the rest of the world was a low of 85,000 thousand long tons, a high of 125,000 thousand long tons, and a median of 105,000 thousand long tons. This compares with estimated consumption in 1968 of 25,300 thousand long tons.

The final comment regarding the end uses of sulfur by consuming industries is prompted by the observation that sulfur is used in a wide range of industries covering most segments of American industry. Liebig's axiom that the economic welfare of a nation can be most accurately measured by its consumption of sulfuric acid appears to be valid today, as it was when he advanced it in the middle of the nineteenth century, though we tend to use the term "welfare" more cautiously today. The diversity of uses for sulfur as an intermediate product subjects the demand for sulfur to the cyclical fluctuations that characterize the manufacturing segment of the economy. At the same time, it makes the long-run demand for sulfur dependent upon growth in industrial production. Statistical tests conducted by this author have shown that the relationship between industrial production and sulfur consumption in the United States has remained unchanged over time.[1]

Demand Projection

Looking to the future, the simplest method of projecting aggregate sulfur demand is to assume that the demand for sulfur will continue to grow at about the same rate as industrial output. Utilizing this procedure, in 1963, Resources for the Future estimated sulfur consumption in the United States at 30 million tons for 2000.[2] The U.S. Bureau of Mines, in its 1970 edition of *Mineral Facts and Problems*, estimated total domestic consumption of sulfur in 2000 to be somewhere in the range of 23 million to 37 million tons, the midpoint of which falls at 30 million tons.[3] The Bureau of Mines forecast, however, did take into consideration changes in the pattern of sulfur consumption.

The pattern of industrial consumption of sulfur remained very stable for many years, the major components being chemicals, inorganic pigments, iron and steel pickling, production of man-made fibers, petroleum refining, and pulp and paper manufacture. In recent years, however, the use of substitutes for sulfur (or for sulfuric acid) has reduced sulfur's share of some of these major industrial markets. One of the primary reasons for substitution has been the difficulty of disposing of spent sulfuric acid and the high cost of regeneration. As public tolerance of pollution has diminished, the search for less offensive alternatives to sulfuric acid has proceeded in many industries.

In iron and steel pickling, a component representing a little over 2 percent of total domestic sulfur demand, the consumption of sulfuric acid has gradually been displaced by the use of hydrochloric acid. The primary reason is that hydrochloric acid presents much less of a disposal problem. In addition, spent sulfuric acid is 8 to 10 percent acid and too costly to regenerate, while hydrochloric liquor is less than 0.1 percent acid, and with one of the newer processes about 80 percent of the acid can be recovered from the pickling bath. Hydrochloric processes are said to give a better-looking sheet than sulfuric acid processes, and overpickling is less of a problem. Over the next 25 to 30 years, it is expected that hydrochloric acid will completely displace sulfuric acid in the pickling of iron and steel.

Another application in which sulfuric acid is facing stiff competition is the manufacture of *inorganic pigments*. Traditionally, titanium dioxide pigments have been made by digesting ilmenite ore with sulfuric acid. Because of the varying content of iron and other impurities in ilmenite ores, the quantity of sulfuric acid used in digestion varies between 3 to 4 tons per ton of titanium dioxide pigment. Titanium slag may also be used to manufacture pigment and thereby acid requirements are reduced to 1.0 to 1.5 tons per ton of pigment. In 1968 about 500,000 tons of sulfur were used in the United States in the manufacture of titanium dioxide pigments, representing about 5.5 percent of the total domestic sulfur demand.

In the late fifties, DuPont introduced a process for manufacturing titanium dioxide pigments from rutile ore using chlorine. This process has gained wide acceptance in recent years because of several factors. Construction costs are about 60 to 70 percent less than those for the sulfuric acid leaching process. Waste from the chlorine process is

[1] Jared Hazleton, *The Economics of the Sulphur Industry* (Washington, D.C.: Resources for the Future, 1970).

[2] Hans H. Landsberg, Leonard L. Fischman, and Joseph L. Fischer, *Resources in America's Future* (Baltimore: The Johns Hopkins Press for Resources for the Future, Inc., 1963), p. 486.

[3] Richard W. Lewis, "Sulfur," in *Mineral Facts and Problems, 1970 Edition*, U.S. Department of the Interior, Bureau of Mines, Bulletin 650, 1970, pp. 1247-1265.

about one eighth of that from sulfuric acid, and chlorine disposal problems are reduced because the chlorine process is continuous and the chlorine recycled. The chlorine process also has a small cost advantage, although it can be used only with rutile ore, which costs over twice as much as ilmenite or titanium slag. It is expected that by 2000, no sulfur will be used in the production of titanium dioxide pigments.

Two additional components of sulfur demand which appear to be diminishing on a relative basis are petroleum refining and pulp and paper manufacturing. Use of sulfuric acid in *petroleum refining* has been decreasing because of the increasing application of solvent-extraction and hydrogenation. Alkylation, a major user in the petroleum industry, is not expanding, mainly because of the change-over in aviation fuel from high octane to kerosene-type fuels and the growing application of hydrofluoric in place of sulfuric acid. Sulfur used in petroleum refining represents a little less than 2 percent of total domestic sulfur consumption today, and it is likely to represent considerably less than that proportion by 2000.

In *pulp and paper manufacture*, the newer sulfate process, which uses sodium sulfate, is steadily replacing the sulfite process, which uses sulfuric acid. The principal advantage offered by the sulfate process is the greater possibility of recovery and regeneration, and the smaller pollution problem. At the current time, sulfur consumed in the manufacture of pulp and paper represents about 6 percent of total domestic sulfur demand. Its share of total demand is expected to decline to about 3 percent of total domestic demand by 2000.

Only in its application in the manufacture of chemicals and man-made fibers and in the leaching of nonferrous metallic ores does sulfur appear to have a favorable outlook among major consuming groups. The use of sulfuric acid in the *chemical industry* is widespread. Curtailment of its use in the manufacture of any single product would probably have little effect on total consumption by the industry, and there is no indication that its use in many or most product lines will decline. In the *synthetic fiber industry*, however, the continued use of sulfur will depend to a great extent on the product mix in the industry. As new synthetic fibers are developed, they obtain shares of the market previously held by rayon, which requires a substantial proportion of sulfur in its manufacture. Many of the newer fibers, such as polyester and olefin, have much smaller sulfur requirements. Some, such as spandex and acrylic, require no sulfur in their manufacture. In the leaching of *nonferrous metallic ores*, sulfur requirements are likely to expand because of changing technology for ore leaching and because of an expansion in uranium production. Taken together, sulfur consumption in the chemical, synthetic fiber, and nonferrous metals industries is expected to expand at a rate commensurate with the growth in industrial production.

Texas sources supplied 50.04 percent of the elemental sulfur produced in the United States in 1971, according to preliminary figures. Production in Texas comes from two sources: the Frasch mines of the Gulf Coast and the sour natural gas wells across the state. In 1969, the latest year for which final figures are available, Frasch sulfur was being produced by six firms operating twelve mines in eight Texas counties. Production in that year totaled 3,289,000 long tons, or about 46 percent of the 7,146,000 long tons of Frasch sulfur produced in the United States. Production of sulfur from sour natural gas and refinery gas streams occurred in forty-five plants in twenty-four Texas counties in 1969. Sulfur currently accounts for approximately 1 percent of the total value of mineral products produced annually in Texas.

In summary, the major characteristic of industrial consumption of sulfur other than by the fertilizer industry is that sulfur requirements will not increase as rapidly as demand for the products in which sulfur is used. Thus the share that sulfur holds in most of these industrial markets will continue to decline.

In recent years, the decline in certain industrial uses of sulfur has been more than offset by the increase in consumption of sulfur in the *manufacture of fertilizers*. For example, in 1963 fertilizer manufacture accounted for about 40 percent of total domestic sulfur consumption. It is estimated that about 77 percent of the growth in demand for sulfur in the United States in the two ensuing years was for the fertilizer industry, with the result that by 1965, the fertilizer industry accounted for 45 percent of total domestic sulfur consumption. Its share, which has been increasing since 1965, now stands at about half of total domestic sulfur consumption. It is likely, therefore, that the future growth in demand for sulfur will depend primarily upon the rate at which sulfur consumption expands in the manufacture of fertilizer.

The production of sulfur-containing fertilizers should continue to give strong impetus to growth of sulfur consumption over the next few decades. Much of this growth will result from continued worldwide pressure on food production. Most of the world's agricultural lands, including those of the United States, can profitably utilize additional fertilization, and steep increases in fertilizer demand seem likely.

Sulfuric acid is used in the manufacture of both phosphatic and nitrogen fertilizers. One of the most important factors behind the increase in demand for sulfur for use in the manufacture of fertilizers has been the trend away from low-analysis fertilizers such as ammonium sulfate and normal superphosphate (which require 521 pounds and 268 pounds of sulfur per ton of product) toward highly concentrated fertilizers such as triple superphosphate and ammonium phosphate (which require 597 pounds and 880 pounds of sulfur per ton of product). Since high-analysis fertilizers require up to 40 percent more sulfur per unit of P_2O_5 in their manufacture, this trend has led to increasing sulfur consumption by the fertilizer industry.

The sulfur used in the manufacture of the low-analysis products, ammonium sulfate and normal superphosphate, is an end component of these materials. In fact, there is more sulfur than nitrogen in a bag of ammonium sulfate and more sulfur than phosphorus in a bag of normal superphosphate. On the other hand, phosphoric acid, triple superphosphate, and ammonium phosphates contain little or no sulfur, and the movement toward high-analysis fertilizers may soon create a need for direct addition of sulfur as a secondary plant nutrient. Soil sulfur deficiencies, which limit crop yields, have been noted in various parts of the world, including Australia, New Zealand, and Brazil, and in at least sixteen states of the United States.

While sulfur consumption by the fertilizer industry increased substantially from 1955 to 1970, substitution of either fertilizers or processes not requiring sulfur inputs may dampen future increases in the demand for sulfur by this industry. As an example of the first type of substitution, the use of nonsulfur nitrogen fertilizers such as urea, anhydrous ammonia, and ammonium nitrates, in place of ammonium sulfate, reduces sulfur consumption. Substitution of the second type is likely to come about through the introduction of different methods of making phosphoric acid. Today over one third of the sulfur consumed in the United States enters into the production of wet-process phosphoric acid. The substitute most commonly suggested for sulfuric acid in the manufacture of fertilizers is nitric acid. It is estimated that nitric phosphates currently have a small but significant cost advantage over ammonium phosphates and ammonium nitrate in large plants. However, incomplete water solubility and inflexibility in N-P ratios continue to present a severe marketing problem. Further, the need for a large-scale plant limits the adaptability of most phosphoric acid operations to the use of nitric acid.[4]

The furnace method of producing phosphoric acid contains none of the product difficulties associated with the nitric acid substitution. However, costs appear to be prohibitive at present. At present, also, no producer is likely to build a plant to produce hydrochloric acid for use in fertilizer manufacture. However, if he is producing hydrochloric acid for some other type of manufacturing operation that requires it, he might well invest his surplus production in the manufacture of phosphatic fertilizers.

In summary, demand for fertilizers should continue to expand over the next few decades, both within the United States and abroad. The most dynamic growth area for sulfur consumption by the fertilizer industry appears to be phosphate fertilizers, which already account for about 36 percent of U.S. sulfur consumption and more than 30 percent of the free world sulfur consumption. The trend toward use of high-analysis products will have limited growth. Since high-analysis products require 40 to 50 percent more sulfur in their manufacture than low-analysis products, the average annual growth of sulfur consumption by the fertilizer industry will be higher than the rate of increase in fertilizer output. Thus the share of the total domestic sulfur market held by fertilizer manufacture should increase from 50 percent to a level of 60 percent by the end of this century. While substitution possibilities, both product and process, are possible, they appear unlikely to affect this outcome significantly over the next few decades.

Table 2

ESTIMATED WORLD SULFUR RESOURCES
(Millions of long tons)

Type and leading sources	Estimated resources	
Elemental		
Frasch (salt dome)		
United States	200	
Mexico	50	250
Native		
United States	100	
Poland	100	
Iraq	200	
Andes	100	
Pacific Basin	50	550
Recovered (oil and gas)		
United States	100	
Canada	350	
France	35	
Middle East	275	
Rest of world	125	885
Oil shale, tar sands, and other bitumen		
United States	1,500	
Rest of world	2,000	3,500
Nonelemental		
Metal sulfides		
United States	50	
Spain	375	
Rest of world	750	1,175
Coal		
United States	13,000	
Rest of world	10,000	23,000
Anhydrite and gypsum		Enormous
Sea water		Enormous
Total		29,360

Note: The information given represents a summary of available estimates of sulfur resources. It combines estimates of proven reserves with those of potential reserves. Where a range of estimates has been made, a representative figure has been arbitrarily selected.

Sulfur Supply[5]

At the time of the 1952 Paley Commission Report, almost all of the domestic supply of sulfur came from the salt dome deposits of the Texas and Louisiana Gulf Coasts. They were mined by a process named for Herman Frasch, who invented it, which utilized a set of concentric pipes, introducing hot water into the deposit, melting the sulfur, and using compressed air to change the apparent specific gravity of the molten sulfur and lift it to the surface. The Paley Commission's projection for the sulfur industry saw supply failing to keep pace with demand. The error in the Paley forecast was not in the demand forecast, which

[4] A 600-ton-per-day nitrophosphate plant would require about 90 tons per day of nitrogen. An economically sized ammonia plant, however, would produce 820 tons per day of nitrogen.

[5] Most of the information in this section is based on material contained in Hazleton, *Sulphur Industry*, pp. 135-144; and Lewis, "Sulfur," pp. 1253-1254.

proved to be nearly perfect, but rather was on the supply side.

The world will require new sources of supply to meet the continuing growth in demand. Fortunately, relatively abundant reserves of sulfur are available, though at slightly higher production costs, and the technology already exists to tap these additional supplies. Further, as these new sources of supply become more important, competitive pressures should act to improve technology and lower the costs of recovery. Table 2 summarizes, in a very rough fashion, the world resource situation for sulfur. While it includes all sources of supply that have been identified, Table 2 should not be taken to imply that all sources will be tapped. The outlook for each major source of sulfur must be examined separately, and the figures given in this table qualified as to origin and meaning.

Frasch Sulfur

The lowest-cost form of sulfur is Frasch sulfur obtained from the salt domes of the U.S. Gulf Coast and the anticlines of the Isthmus of Tehuantepec in Mexico. The U.S. Bureau of Mines estimates the reserves of known onshore and offshore U.S. salt dome deposits at 100 million tons with an additional 90 million tons potential. Intensive past exploration by the oil and gas industry suggests that additional sulfur-impregnated domes will not be discovered on the mainland at depths favorable for the recovery of sulfur. However, there are abandoned onshore Frasch mines that can be reworked and five such mines were reopened during the most recent sulfur shortage.

The offshore area of the Gulf Coast has not been thoroughly explored for sulfur, and the extent of potential offshore reserves may not be known for several years. It is likely that additional deposits of sulfur will be discovered in the offshore area, but they may prove too costly to mine to be classified with other salt dome deposits as low-cost sources. Offshore exploration is estimated to be five times as costly as onshore exploration, and operating costs offshore probably run at least 1.5 to 2.5 times higher than those for an onshore mine of similar size and quality.

Estimated reserves in known Mexican anticline deposits on the Isthmus of Tehuantepec range from 50 to 60 million tons. However, Mexican sources indicate that the bulk of the Tehuantepec area has not been carefully surveyed by geologists. Further exploration on the isthmus will probably result in the discovery of additional deposits of sulfur, but the irregular structure of the isthmus formations makes it difficult to estimate the commercially recoverable quantities that might be added.

Native Ore Deposits

Sulfur ore also occurs in volcanic, hot spring, sedimentary, and replacement deposits. The sulfur content of these native ore deposits is similar to that of the Gulf Coast salt dome deposits—20 to 40 percent—though occasional deposits contain up to 95 percent sulfur. Most of these native ore deposits are located in remote areas, many of them are quite small, and production and transportation costs are higher than for either Frasch or recovered sulfur. In general, these sources are used to supply local markets.

In the United States, small hot-spring, volcanic, and sedimentary native sulfur deposits have been found in the Rocky Mountains and western states. Perhaps the most important domestic sulfur-bearing formations, except for the salt domes of the Gulf Coast, occur in Pecos and Culberson Counties in West Texas, where reserves of sedimentary deposits have been estimated to have 100 million tons of recoverable sulfur, most of which is amenable to Frasch mining.

The largest known deposits of volcanic ores occur in the 3,000-mile Andes mountain chain in South America, where reserves have been estimated to contain as much as 100 million tons of sulfur. The most important of the one-hundred-odd deposits are found in Chile, where occurrences of high-grade (45-95) sulfur are estimated at 40 million tons. Similar deposits, generally having lower sulfur content, are known to exist in Peru, Argentina, Bolivia, Colombia, Ecuador, Mexico, Venezuela, Costa Rica, and the Galapagos Islands.

Japan has at least forty known deposits of volcanic sulfur with sulfur content estimated as ranging from 25 to 50 million tons. Other Asiatic countries also have volcanic sulfur deposits, but most of them are too small and too remote to be considered as recoverable reserves under almost any conditions.

The most important sedimentary deposits are found in the southeastern portion of Poland in the Tarnobrzeg basin. Reserves are estimated at over 100 million tons. Open pit mining is employed with flotation and filtration processing. Efforts to utilize hot water and chemical solvent processes have been at least partially successful. Nearby is a smaller deposit which is also being developed. Other areas having large sedimentary deposits include the USSR, Sicily, and mainland China. There is also a large native sulfur deposit in the Mishraq area of northern Iraq. The Iraq reserves are estimated at more than 200 million tons.

The most important addition to the world's elemental sulfur reserves since the Korean War sulfur shortage has been the increased recovery of elemental sulfur from sour natural and refinery gases. Since the factors governing the availability of elemental sulfur from natural gas are quite different from those governing availability from petroleum, the two sources of recovered sulfur are considered separately.

Natural Gas

The sulfur content of U.S. natural gas averages about 0.05 percent by weight. The sulfur content occurs as hydrogen sulfide in concentrations ranging from none to as high as 70 percent. In Canada, the hydrogen sulfide content ranges from 10 to 15 percent. French plants at Lacq and nearby Mellion process gas which has a 5- to 15-percent hydrogen sulfide concentration. Current technology enables the extraction of up to 95 percent of the sulfur contained in the gas stream.

When it comes to estimating the reserves of sulfur that might be recovered from the gas fields, it is difficult to set a standard criterion for inclusion. Gas transported to fuel markets must be "sweetened" (the sulfur removed) if the hydrogen sulfide content is too high. If the gas contains more than 0.25 grain of sulfur per 100 cubic feet, it is generally disqualified for sale to domestic customers. This suggests that natural gas fields with a sulfur content of over 0.078 percent by weight should properly be considered as sulfur reserves *provided* a market exists for the gas, for if the gas is to be marketed, the hydrogen sulfide must be removed. Natural gas fields having sulfur concentrations lower than 0.078 percent by weight should not be included in reserve estimates unless sulfur prices increase substantially. Sour gas fields having concentrations of sulfur above the maximum allowable but without access to markets must be treated individually.[6]

Reasonably accurate reserve estimates have been developed for sour gas fields in Canada, France, and the United States where sulfur is presently being recovered. For other areas of the world, only very rough approximations can be made. The U.S. Bureau of Mines estimates sulfur resources from natural gas at 50 million tons. This figure is based on an average sulfur content of 0.05 percent for natural gas. The potential reserves of sulfur in the sour gas fields of Alberta have recently been estimated by the Canadian Petroleum Association at 350 million tons. In making this estimate, the ratio of present proved sulfur reserves to proved reserves of natural gas with which they are associated was applied to the estimates of potential reserves of natural gas. Estimates of reserves at the two sour gas fields in France range from 25 to 50 million tons. On the basis of proven reserves in excess of 10 trillion cubic feet of gas, having an average concentration of hydrogen sulfide of 15 percent, and allowing for 80 percent recovery, an estimate of 35 million tons appears reasonable.

Middle East sour gas reserves are difficult to estimate. Sour gas fields are known to exist in Iraq, Kuwait, Iran, and Saudi Arabia. Estimates of reserves range from 250 to 50 million tons, but a figure of 75 million tons appears more realistic, given the distance of many of these fields from markets for natural gas.

Crude Petroleum

Crude oils have widely varying sulfur content, ranging from 0.04 percent (Pennsylvania) to 4.5 percent (Mexico). In the United States, the average sulfur content of crude petroleum is 0.16 percent. Crudes containing higher amounts are usually blended with low-sulfur crude oils. In the past, because of the added difficulty of processing high-sulfur crude, many sources of high-sulfur crude were bypassed in favor of low-sulfur content crude. However, in recent years, it has become necessary to process crudes with an increasingly high average sulfur content. The Bureau of Mines estimates sulfur resources from crude oil at 50 million tons.

It has been estimated, conservatively, that recoverable reserves amount to 330 million tons. Since proven reserves of oil are measured conservatively, sulfur resources measured more broadly would be as much as ten to twenty times above the estimate.

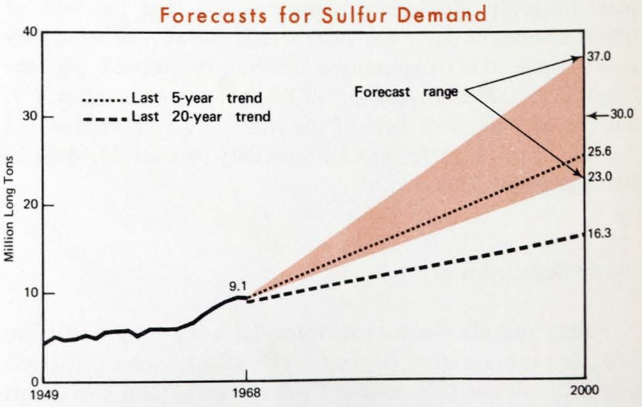
Other Hydrocarbons

Large potential reserves of sulfur exist in the known deposits of other hydrocarbons such as bituminous rock, tar sands, and shale oil, but the range of estimates is very wide, depending on the estimator's judgment of the timing and feasibility of developing the hydrocarbon resource itself. On the basis of an average sulfur content of 0.75 percent, the Bureau of Mines reports probable sulfur in known recoverable reserves of oil shale at 1.5 billion tons. On the basis of estimated oil content in tar sands deposits of 490 billion barrels for the world, and assuming a recovery factor of 60 percent, the sulfur content of bituminous rock and tar sands would be 2 billion tons for the rest of the world.

Metal Sulfides

Metal sulfides, such as iron-bearing pyrites and various nonferrous ores that are smelted or refined for their copper, lead, and zinc content, are important sources of sulfur. These are widely distributed and can be found in all types of rocks. Practically all of the sulfur in nonferrous sulfides is released as sulfur dioxide in waste gas and is normally recovered only when plants are located near sulfuric acid markets. Potential world reserves of sulfur in metal sulfides are estimated to be 1 to 1.5 billion tons. The U.S. Bureau of Mines estimates that domestic sulfides, other than coal, contain from 200 to 300 million tons of sulfur, but

Comparison of Trend Projections and Forecasts for Sulfur Demand



Source: U.S. Department of the Interior, Bureau of Mines.

[6] See Arthur D. Little, Inc., *The Free World Sulphur Outlook* (Cambridge, Massachusetts: Arthur D. Little, Inc., April 1966), p. 40.

reasonable estimates of economic reserves are 25 million tons for pyrite and 25 million tons for other sulfides.

The principal producing countries for nonferrous sulfides are Japan, the United States, Canada, and the USSR. Spain has the largest reserves of pyrites, about 1 billion tons of ore. Other important sources are the USSR, China, Canada, Cyprus, France, West Germany, India, Italy, Japan, the Philippines, Norway, Portugal, Sweden, Turkey, Brazil, and North Korea. But given the wide dispersal and the variety of conditions under which sulfur may or may not be recovered, estimates of world production potential are only rough orders of magnitude.

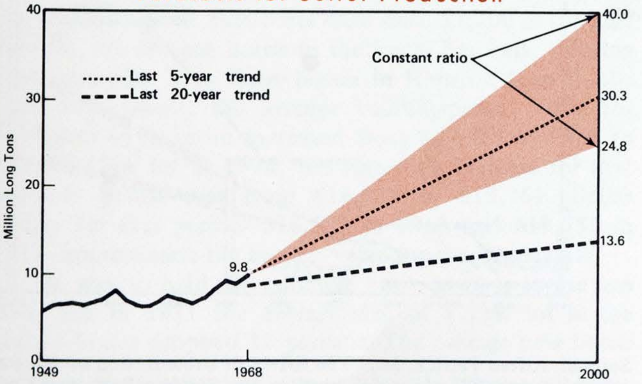
Anhydrite and Gypsum

Sulfur may also be obtained from anhydrite and gypsum (calcium sulfate). Reserves of these sources are enormous and widely dispersed throughout the world. Gypsum is decomposed in the presence of silica, alumina, and carbon to produce sulfur dioxide and portland cement. Gypsum and anhydrite are also reacted with ammonia and carbon to produce ammonium sulfate. In recent years, the United Kingdom has met its need for additional sulfur by using more anhydrite. For example, 700,000 tons of anhydrite can be substituted for 140,000 tons of sulfur for the manufacture of 400,000 short tons of sulfuric acid, with the residue from the decomposition of the anhydrite being used to manufacture cement.

Coal

Coal is another substantial source of sulfur. At the present time, the sulfur content is generally discharged to the atmosphere as sulfur dioxide in stack gases, although some is recovered in Europe. According to the U.S. Bureau of Mines estimate, based on an average sulfur content of 2.6 percent, mineable coal deposits in the United States contain a potential of 13 billion tons of sulfur. How much of the sulfur content will be recovered is another matter, depending not only on the amount of coal that will be burned, but on the fraction that will be considered innocuous if left in the stack gas and on the economy of the recovery process.

Comparison of Trend Projections and Forecasts for Sulfur Production



Source: U.S. Department of the Interior, Bureau of Mines.

Sea Water

The final source of sulfur is the sea. Sulfur is the fourth most abundant element in sea water, following chlorine, sodium, and magnesium; but unless sulfur is obtained as a by-product in the production of rarer minerals from sea salts, there is no foreseeable economic justification for investment in the complex technology required to extract sulfur from the sea.

Summary of Resource Situation

Nearly 4 billion tons of sulfur are potentially available from sources considered to be economic or to approach economic exploitation levels. (The level for economic exploitation used in this calculation is the 1968 price of about $40 per ton. Sulfur prices are considerably below that level at present.) Some of these sources, Frasch, native, recovered, and pyrites, may prove to have substantially higher reserves. Coal, gypsum, anhydrite, and sea water provide an enormous backup potential which brings the sulfur content of known sources to over 20 billion tons. The question, then, is not whether the resource base can expand to meet increases in demand, but rather, at what price additional supplies of sulfur will be forthcoming and in what order these supplies will be tapped.

Environmental Control Implications[7]

The U.S. Public Health Service estimates that each year 28.6 million tons of sulfur oxides are emitted into the atmosphere. Sulfur oxide emissions are increasing at a rate of from 6 to 7 percent per year. The principal sources of these emissions are coal- or oil-fired electric utilities and industrial plants. In the long run it is likely that a shift from fossil fuels to nuclear power generation will reduce the magnitude of the sulfur oxide problem. However, this is not likely to occur until better means of nuclear generation can be developed, means which do not present the threat of thermal pollution and accidental radiation emissions. In the meantime, it is likely that over the next decade, legislation, mainly at the local level, will require the sulfur oxide content of power plant fuels and stack emissions to be reduced to a level of from 0.5 to 1.0 percent.

Desulfurization of stack and fuel gases is technically feasible at present. Desulfurization of stack gases will probably contribute the most in the short run to the reduction of air pollution. First-generation desulfurization

[7] See Jared Hazleton, "Impact on Raw-Material Markets of Environmental Policies," *Technological Forecasting and Social Change* 3 (1972): 357-359.

facilities for stack gases are already in use. Research on second-generation methods is underway.

Residual fuel oil which ranges in sulfur content from 1.47 to 2.6 percent can be treated to reduce the sulfur content to 0.5 percent. Desulfurization of coal is less likely to occur. It is possible to remove from 20 to 60 percent of the sulfur contained in coal by physical means. The remaining 40 to 80 percent of the contained sulfur can be removed only by converting the coal to a gas and cleaning the gas stream. While this is technically feasible, it is more likely that utilities will switch to low-sulfur coal, in abundant supply in the United States. However, these low-sulfur deposits are often far removed from the place of use.

The technology and economics of removal of sulfur from stack gases will be greatly affected by the market for elemental sulfur. It has been estimated that in the year 2000, potential sulfur from utilities alone without abatement would be 112 million long tons. This implies removal of 79 million long tons a year just to hold the level of pollution from this source to the 1970 level of 33 million tons. Compare this estimated supply from recovered sulfur with estimated U.S. demand in 2000 of 30 million tons!

Sulfur recovery from stack gases will not only yield increased supplies of either elemental sulfur or its principal product, sulfuric acid, but also provide those supplies as a by-product in plants widely distributed across the nation. This will have two effects on sulfur markets. First, whereas sulfur production is at present concentrated in the Frasch deposits of the Texas-Louisiana Gulf Coast, the deposits in West Texas, and the sour gas fields of the Southwest, recovered sulfur from stack gases will be available wherever sulfur-bearing fuels are used, principally in urban industrialized areas. This should result in a shift to a pattern of small local markets served mainly by local sources.

Second, the price of elemental sulfur has been in large measure controlled by the two principal producers of domestic Frasch sulfur. Prices have been relatively stable historically, and profits have been relatively high. However, widespread desulfurization of stack gases will provide a means of entry into the industry and will probably disturb the stability of sulfur markets, resulting in lower prices.

Lower prices will affect the economics of sulfur-removal techniques. Lack of local markets for sulfur may result in a preference for removal techniques which do not produce by-product sulfur, such as those employing limestone and dolomite, rather than catalytic conversion, alkalized alumina sorption, or chemical absorption processes.

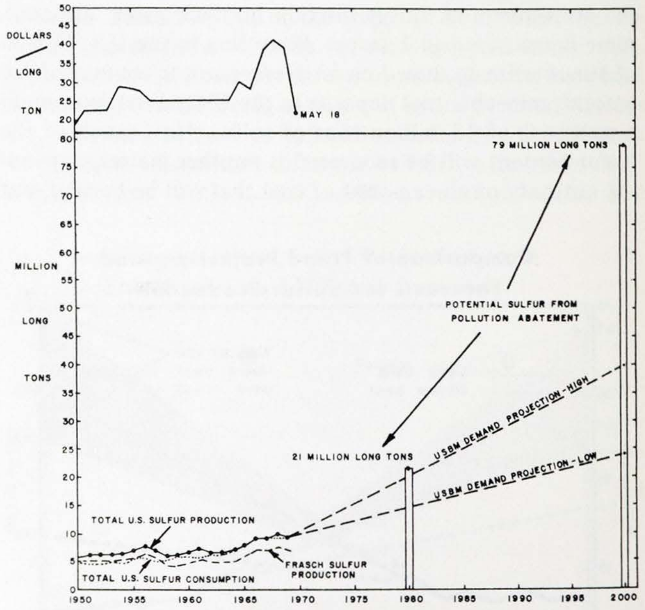
In the long run, as noted by the American Chemical Society's Committee on Chemistry and Public Affairs, it does not seem likely that emission of sulfur by industrial combustion of fossil fuels can be controlled to the extent required by stack-gas treatment.[8] The sources are too numerous, too small, too diverse. It is likely that substitution of low-sulfur fuels or development of new combustion processes with reduced sulfur oxides emission will be required.

Conclusion

The domestic sulfur industry provides an excellent, almost textbook, example of the manner in which resources respond to market forces. Twice within the past twenty years, the price of sulfur has risen substantially in response to a shortage of sulfur. In both cases, the period of high prices was followed by a period characterized by the introduction of new sources of supply that quickly led to a reduction in the price of sulfur. However, one might ask why the adjustment did not come about more smoothly and without the development of a serious shortage. The answer appears to be found in the institutional constraints operating upon the market. In the first shortage, the federal government placed price controls on the industry, tending to delay the development of new sources of supply. In the second instance, the Mexican government placed certain restrictions on supply and the U.S. government imposed informal price controls on the industry. Both actions tended to delay response to the shortage.

Apparently the domestic sulfur industry does respond to market forces. National policy should be designed to insure that these market forces are permitted to develop. The imposition of formal or informal price controls at home, the introduction of import duties or quotas, and the development of an international sulfur cartel abroad all restrict the free market and undermine its vital role in ensuring a continuing supply of sulfur. U.S. sulfur resource policy should be aimed at maintaining a free market for sulfur, both at home and abroad.

SULFUR DEMAND PROJECTIONS RELATIVE TO SULFUR SUPPLY FROM POLLUTION ABATEMENT



Source: Alfred Petrick, Jr., "The Effect of Urbanization on Mineral Demand," paper delivered to the Western Resources Conference, Denver, Colorado, July 1970.

[8] See American Chemical Society, Committee on Chemistry and Public Affairs, *Cleaning Our Environment: The Chemical Basis for Action* (Washington, D.C.: The American Chemical Society, 1969), p. 71.

TEXAS CONSTRUCTION*

THE CONDOMINIUM CONCEPT

Kathleen Luft

Today's families, in Texas and in the nation, want much more than just a roof over their heads. Increasing concern with wise use of the land, with control of urban growth through comprehensive planning and design, and with availability of recreational amenities that fit new lifestyles has created a desire for housing that "would not mar the land but grace it," as a Dallas builder promises. As the facts of housing economics—rising costs of land, site improvement, building materials, and labor, in combination with municipal costs—make that dream more difficult to realize independently, more Americans are accepting the idea of multifamily housing as a solution for their dilemma.

Indeed, middle- and low-income families have little choice: the traditional single-family home is not easily attainable. Its price has been pushed up by the costs of materials: lumber prices, up 25 percent in the past year, are still rising, and a shortage of cement, likely to last through 1980, has caused the price of bag cement to jump over 52 percent in recent months in the Southeast. Increases in construction wages have accelerated, too. In 1971 average hourly earnings for all contract construction workers rose 9 percent; overall construction costs, as measured by the U.S. Department of Commerce composite cost index, rose 7.4 percent. In Texas, residential construction costs have increased 43.2 percent in the past five years.

Even greater than the increase in building costs is the increase in urban land values, a rise of more than 400 percent since 1952. Since 1965 the cost of living has risen about 32 percent, according to the consumer price index; the price of a single-family home in the United States has increased by 50 percent—much faster—and it continues to rise at a rate of between 10 and 25 percent a year.

Builders are trying to cope with the problem, with at least some degree of success. One Dallas firm, Fox and Jacobs, has managed to roll back prices on two of its under-$25,000 lines and maintain 1970 prices on another. In Houston, however, where labor has been in short supply, one builder reports that costs have risen $1,200 in the past year for the average house in the lower brackets. Housing costs generally have been higher in Houston than in the state as a whole: the average building-permit value for residences in Houston increased from $18,761 in 1968 to $23,476 thus far in 1972; the statewide increase for that five-year period was from $16,339 to $19,761. Dallas figures for that period—$16,551 in 1968 and $19,653 in 1972—approximate the average value for the entire state.

One way to hold the purchase price down is to use less land, and in 1971 the average size of a new lot in the United States dropped 12 percent. The average new house was only slightly larger last year—4 percent—but the average purchase price, despite builders' efforts, rose 25 percent. Bigger, however, is not necessarily better: the quality of the average new house has not improved. Amenities are fewer in number, and some buyers must pay more to have the floors finished. According to a recent *House & Home* analysis of the Houston housing market, homes in the lower-priced subdivisions "come across like post-war cracker boxes with their chopped-up floor plans, postage-stamp bedrooms, and very limited kitchen cabinet and closet space."

As traditional rectangular lots become smaller and houses grow slightly larger, much of the available space in each parcel of land is occupied by parking surfaces and virtually useless side yards and front areas. Little ground is left for the enjoyment of the new landowner.

By contrast multifamily housing uses the land much more wisely and economically. One acre of land, which has room for three conventional single-family houses, can

*Data used in this article come only from building-permit-issuing urban places.

ESTIMATED VALUES OF BUILDING AUTHORIZED IN TEXAS*

Classification	Aug 1972 (thousands of dollars)	Jan-Aug 1972 (thousands of dollars)	Percent change: Aug 1972 from Jul 1972	Percent change: Jan-Aug 1972 from Jan-Aug 1971
All permits	289,926	2,425,063	12	20
New construction	264,674	2,202,381	14	22
Residential (housekeeping)	156,606	1,210,081	33	19
One-family dwellings	103,743	779,121	38	25
Multiple-family dwellings	52,863	430,960	24	10
Nonresidential buildings	108,068	992,300	− 5	26
Hotels, motels, and tourist courts	7,294	40,796	204	45
Amusement buildings	1,033	15,865	− 24	− 22
Churches	6,321	26,886	166	14
Industrial buildings	8,163	69,132	16	− 6
Garages (commercial and private)	2,489	34,231	311	10
Service stations	839	9,130	− 1	− 21
Hospitals and institutions	11,314	58,093	194	31
Office-bank buildings	19,290	225,744	− 50	4
Works and utilities	2,666	69,143	− 76	89
Educational buildings	13,138	152,180	3	16
Stores and mercantile buildings	31,663	258,566	12	87
Other buildings and structures	3,858	32,534	− 25	3
Additions, alterations, and repairs	25,252	222,682	− 8	3
SMSA vs. non-SMSA				
Total SMSA†	259,157	2,215,569	9	20
Central cities	187,419	1,565,508	10	23
Outside central cities	71,738	650,061	5	14
Total non-SMSA	30,769	209,494	49	20
10,000 to 50,000 population	16,296	118,453	48	30
Less than 10,000 population	14,473	91,041	51	9

* Only building for which permits were issued within the incorporated area of a city is included. Federal contracts and public housing are not included.
† As defined in 1970 Census.
Source: Bureau of Business Research in cooperation with the Bureau of the Census, U.S. Department of Commerce.

accommodate ten townhouses, twenty garden apartments, or one hundred high-rise apartment units. Such compact living patterns can, if the project is expertly designed and competently executed, produce a living environment far more luxurious than most Americans can now achieve independently. And, after a decade in which more and more people—particularly single people, young married couples with no children, and retired people—grew accustomed to living in apartments, Americans are increasingly willing to make permanent commitments to an interdependent way of living by purchasing units in multifamily projects: in 1971 16 percent of the nation's housing starts were condominiums; in 1972 the figure will rise to 27 percent.

Condominium, by no means a new concept, is a form of legal ownership of real property that permits complete ownership of an individual dwelling unit and partial ownership of other elements of the development. Joint dominion offers a variety of advantages. The canny purchaser actually is getting more housing for his money, since the percentage of land cost in relation to the total cost of the unit usually is less than the percentage for a single-family dwelling. Monthly living costs are low in comparison to house payments and frequently are even lower than apartment rental costs.

Further, advocates of the multifamily concept point out that the purchaser of a condominium has the same tax advantages as the owner of a one-family house. He also has the possibility of building up equity and the chance to speculate in land values, and if he resells the unit, his profits—and some two-year-old condominiums recently brought as much as 25 percent over the original selling price—are taxed as capital gains, not as ordinary income.

Common maintenance of the grounds results in lower costs for each family. One unexpected result of this system of exterior maintenance is the increased availability of mortgages to single, divorced, and widowed women. Many lenders, freed from worries about women's ability to wield pruning shears and paint brushes, are showing a greater willingness to make home loans to women who wish to purchase condominiums.

Other advantages include better locations, possible because land is used more efficiently and economically and hence is less expensive for developers. Many multifamily communities offer amenities and luxuries which might otherwise lie beyond buyers' means. In some developments housing is successfully integrated with parking and public transportation. A less tangible, but important benefit for Americans is pride of ownership.

A variety of condominium styles are available: townhouses, low- and high-rise apartments, duplexes, fourplexes, cluster homes, and garden apartments are the most common types. Prices range from $11,000 to $90,000 and more in large Texas cities. Houston's Norchester subdivision, at the upper end of the scale, offers "townhouse villas" with atriums, Spanish-type architecture, eight-foot-high attached fences, ten-foot-high ceilings, and three thousand feet of living area for $65,000 and up.

The townhouse, perhaps because it is more similar to the traditional house than are the other styles, has been popular with purchasers. Builders, too, like townhouses, since corridors and common entry areas are not needed, and since such units would be suitable for modular construction, should the problems of the modular housing industry be solved satisfactorily. In some parts of the country a hybrid style—detached single-family condominiums with shared property lines that eliminate sideyards—combines elements of one-family and multifamily housing. Maintenance of the façades and grounds, as in other condominium projects, is the responsibility of a home owners' association.

Texas buyers, possibly believing themselves to have more *Lebensraum* available than inhabitants of smaller states, have been slow to accept the high-rise and high-density condominiums, preferring the townhouse or detached one-family structure, sometimes in one of the new planned unit developments that also include rental apartments. But, at an average of ten units per acre—a maximum of twelve, if zoning permits—the townhouse is not the most economical way to use land. Further, the prices of townhouses are climbing, and they, like single-family houses, may soon price themselves out of the original market. Ultimately the townhouse is not the answer to the nation's housing problems, even if the development of new communities does make more and possibly cheaper land available for housing.

No type of condominium is free from problems. Noise can be annoying, particularly in larger projects. Competent managers are difficult to find, especially for the large developments, and without financial and diplomatic exper-

AUGUST BUILDING STATISTICS IN REVIEW

Texas homebuilding resumed its strong pace in August. The Bureau of Business Research index of residential construction authorized rose in August by 35 percent to 216.3 from July's 160.3, the lowest figure recorded in 1972. Despite weakness in the nonresidential sector—permits authorized dropped to 148.3, a decline of 5 percent from July's level—the index of total construction authorized is 12 percent ahead of the pace for July and 5 percent ahead of that for August 1971.

Construction continues to add substantially to the state's economic activity. The total estimated value of building authorized for 1972 has reached $2.4 billion, with large increases over July figures in the categories of one-family and multiple-family dwellings and apartment buildings.

Among Texas SMSA's, Dallas, with $551.1 million, ranks first in total value of building authorized in 1972. Houston, showing a 2-percent decrease from 1971, reported authorizations totaling $547.6 million.

tise, the problems of maintenance, enforcement of the project's regulations, and dissent among owners can ruin any multifamily project.

Ironically, the condominium is now being used to combat a problem it helped to create. Rental apartment vacancy rates were high in some Texas cities early in 1972: 19 percent in Tarrant County (Fort Worth), 12.2 percent in Dallas, and 15 percent in Houston. The apartment market has softened partly because the availability of funds has resulted in overbuilding, partly because that same easy money has enabled would-be buyers to purchase homes more easily. And a good many former rental-apartment dwellers have chosen condominiums. Troubled apartment owners, however, have found that they can convert their rental units to condominiums, if the rental problems were not caused by bad planning, a bad location, or flimsy construction. In Dallas, Richardson Life Style, a new rental building, was converted this summer to a condominium, and last year American Condominium Corporation converted 170 units, a volume that the company expects to double in 1972. In Houston, many sites originally developed for rental apartments were offered for townhouses or fourplexes early this year.

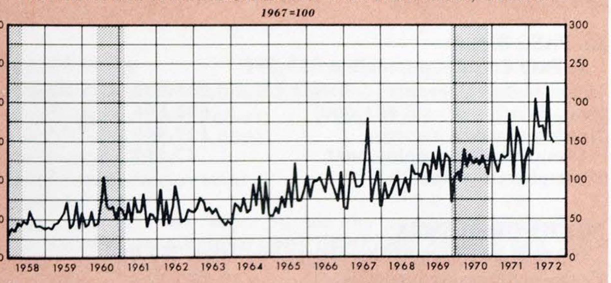
In addition to its role as a primary dwelling unit, the condominium is playing an increasingly large part in the thriving vacation-home market: approximately 40 percent of all for-sale resort houses begun in the United States during 1972 will be condominiums. Three-day weekends and longer vacations are providing Americans with more leisure. For the more affluent, a condominium is a tax shelter and an excellent investment, as well as a possible generator of profit, if the owner makes the unit available for rental. If the location is right, a $50,000 unit can rent for as much as $3,000 a month. Further, condominiums in certain locations—next to a golf course, on a beach, or near a ski slope—have a high rate of appreciation. Some investors purchase suites in condominium hotels such as Cliff House in the Morgan's Point development at Lake Belton; others are attracted by the "aquaminium," a new, floating, version of the condominium.

If, as many planners believe, large-scale multifamily housing is inevitable, someday Americans may live in the floating tetrahedral cities designed by Buckminster Fuller. Two hundred stories high, they will provide two-thousand-square-foot terrace apartments, in the form of tray-like receptacles, for one million people. About half the space could be used for recreation or gardening. Owners will simply plug in their units: trailers, house-boats, or other "mobile environmental controls." The ease of "peeling off" and moving to another location in the building or to another city would eliminate at least one disadvantage of current for-sale multifamily housing: noisy or uncongenial neighbors could be left behind without selling the housing unit.

Fuller, as well as other contemporary architects, has designed projects that propose less radical solutions to the problems of land use, projects that, unlike the floating cities, would not separate housing so completely from land resources, would not remove man from his accustomed environment. Those designs too, by treating land as a basic element, rely on high-density multifamily housing, a concept that Americans have already begun to take seriously. The experience of living in today's rental apartments and condominiums could result in an easy and gradual transition to spatial arrangements that now seem strange.

NONRESIDENTIAL BUILDING AUTHORIZED, TEXAS*

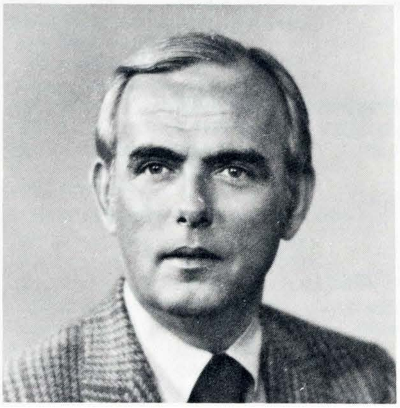
1967=100



*Excludes additions, alterations, and repairs.
The indexes for nonresidential building are not adjusted for seasonal variation because there is no specific seasonal trend.
NOTE: Shaded areas indicate periods of decline of total business activity in the United States.

DIRECTOR'S NOTE

Beginning with the September issue of *Texas Business Review*, the duties of the editor have been assumed by Mr. Robert H. Ryan. Mr. Ryan, who has held the positions of associate editor and managing editor of the *Review*, is an assistant professor of business communications in the College of Business Administration of The University of Texas at Austin. He also serves in the Bureau of Business Research as editor of the *Atlas of Texas*.



Mr. Ryan, who joined the Bureau in 1951 as editor of research monographs and occasional publications, was the initiator of the weekly radio series "Texas Business Review." He has contributed a number of feature articles and columns to the *Review* and is the author of numerous articles and monographs, including *Corpus Christi: Area Resources for Industry* and many other regional studies.

While on leave from the University during the 1950s, Mr. Ryan, as industrial economist at Southwest Research Institute in San Antonio, supervised publication of the *Southwest Resources Handbook*. He has worked also as a business consultant, particularly in bank and savings and loan marketing studies.

Stanley A. Arbingast
Director

LOCAL BUSINESS CONDITIONS

Statistical data compiled by Mildred Anderson, statistical associate, *Constance Cooledge,* statistical assistant, *and Kay Davis,* statistical technician.

The indicators of local business conditions in Texas which are included in this section are statistics on bank debits, urban building permits, and employment. The data are reported by metropolitan areas in the first table below and by municipalities within counties in the second table.

Standard metropolitan statistical areas (SMSA's) in Texas are defined by county lines; in the first table the counties included in the area are listed under each SMSA. Since the Longview-Kilgore-Gladewater area is functioning as a significant metropolitan complex in its region, although not officially designated as an SMSA by the Bureau of the Census, data for this area have been included in the table for SMSA's. In both tables the populations shown for the SMSA's and for the counties are the population counts of the 1970 Census. In the second table the population values for individual municipalities are also counts of the 1970 Census, unless otherwise indicated. Population estimates made for municipalities in noncensus years are commonly based on utility connections, and these estimates are subject to the errors inherent in a process dependent on base ratios derived in 1960.

The values of urban building permits have been collected from participating municipal authorities by the Bureau of Business Research in cooperation with the Bureau of the Census of the U.S. Department of Commerce. Inasmuch as building permits are not required by county authorities, it must be emphasized that the reported permits reflect construction intentions only in incorporated places. Permits are reported for residential and nonresidential building only, and do not include public-works projects such as roadways, waterways, or reservoirs; nor do they include construction let under federal contracts.

The values of bank debits for all SMSA's and for most central cities of the SMSA's have been collected by the Federal Reserve Bank of Dallas. Bank debits for the remaining municipalities have been collected from cooperating banks by the Bureau of Business Research.

Employment estimates are compiled by the Texas Employment Commission in cooperation with the Bureau of Labor Statistics of the U.S. Department of Labor.

Footnote symbols are defined on pp. 225 and 232.

INDICATORS OF LOCAL BUSINESS CONDITIONS FOR STANDARD METROPOLITAN STATISTICAL AREAS
August 1972

Reported area and indicator	Aug 1972	Percent change from Jul 1972	Percent change from Aug 1971
ABILENE SMSA			
Jones and Taylor Counties; population 113,959			
Urban building permits (dollars)	2,688,126	51	390
Bank debits, seas. adj. ($1,000)	224,036	5	7
Nonfarm employment	39,700	**	3
Manufacturing employment	5,800	**	7
Unemployed (percent)	3.6	– 8	– 12
AMARILLO SMSA			
Potter and Randall Counties; population 144,396			
Urban building permits (dollars)	4,501,193	– 1	217
Bank debits, seas. adj. ($1,000)	669,665	6	20
Nonfarm employment	62,000	**	– 1
Manufacturing employment	8,100	1	– 6
Unemployed (percent)	3.4	– 21	– 15
AUSTIN SMSA			
Travis County; population 295,516			
Urban building permits (dollars)	19,410,796	11	101
Bank debits, seas. adj. ($1,000)	1,054,227	3	7
Nonfarm employment	143,600	**	6
Manufacturing employment	13,560	1	4
Unemployed (percent)	2.6	– 7	8
BEAUMONT-PORT ARTHUR-ORANGE SMSA			
Jefferson and Orange Counties; population 315,943			
Urban building permits (dollars)	2,713,624	– 16	3
Bank debits, seas. adj. ($1,000)	595,681	5	3
Nonfarm employment	121,700	– 1	2
Manufacturing employment	37,700	**	1
Unemployed (percent)	5.3	**	– 9
BROWNSVILLE-HARLINGEN-SAN BENITO SMSA			
Cameron County; population 140,368			
Urban building permits (dollars)	2,272,090	2	– 16
Bank debits, seas. adj. ($1,000)	213,046	9	51
Nonfarm employment	46,300	4	11
Manufacturing employment	7,730	– 4	23
Unemployed (percent)	6.9	– 7	– 10
BRYAN-COLLEGE STATION SMSA			
Brazos County; population 57,978			
Urban building permits (dollars)	3,308,730	395	221
Bank debits, seas. adj. ($1,000)	132,522	21	29
(Monthly employment reports are not available for the Bryan-College Station SMSA.)			
CORPUS CHRISTI SMSA			
Nueces and San Patricio Counties; population 284,832			
Urban building permits (dollars)	6,207,405	– 1	– 8
Bank debits, seas. adj. ($1,000)	622,747	2	15
Nonfarm employment	101,400	– 1	**
Manufacturing employment	11,200	– 1	– 2
Unemployed (percent)	5.4	– 10	20
DALLAS SMSA			
Collin, Dallas, Denton, Ellis, Kaufman, and Rockwall Counties; population 1,555,950			
Urban building permits (dollars)	54,490,161	32	– 14
Bank debits, seas. adj. ($1,000)	13,127,315	7	16
Nonfarm employment	743,600	**	3
Manufacturing employment	151,925	**	3
Unemployed (percent)	3.1	– 6	– 23
EL PASO SMSA			
El Paso County; population 359,291			
Urban building permits (dollars)	8,925,802	– 32	– 3
Bank debits, seas. adj. ($1,000)	881,804	9	22
Nonfarm employment	127,400	**	3
Manufacturing employment	27,650	1	3
Unemployed (percent)	5.4	– 5	8
FORT WORTH SMSA			
Johnson and Tarrant Counties; population 762,086			
Urban building permits (dollars)	17,980,229	– 15	– 11
Bank debits, seas. adj. ($1,000)	2,526,777	5	2
Nonfarm employment	294,500	1	1
Manufacturing employment	71,650	5	3
Unemployed (percent)	4.9	– 4	– 21

Reported area and indicator	Aug 1972	Percent change from Jul 1972	Percent change from Aug 1971
GALVESTON-TEXAS CITY SMSA			
Galveston County; population 169,812			
Urban building permits (dollars)	1,433,308	107	11
Bank debits, seas. adj. ($1,000)	281,981	16	15
Nonfarm employment	63,300	**	4
Manufacturing employment	10,950	**	– 2
Unemployed (percent)	6.0	– 2	**
HOUSTON SMSA			
Brazoria, Fort Bend, Harris, Liberty, and Montgomery Counties; population 1,985,031			
Urban building permits (dollars)	62,591,936	– 21	– 27
Bank debits, seas. adj. ($1,000)	12,185,935	6	21
Nonfarm employment	905,700	**	4
Manufacturing employment	148,200	– 1	**
Unemployed (percent)	3.4	– 11	6
KILLEEN-TEMPLE SMSA			
Bell and Coryell Counties; population 159,794			
Urban building permits (dollars)	7,234,196	68	158
Bank debits ($1,000)	151,432	8	18
(Monthly employment reports are not available for the Killeen-Temple SMSA.)			
LAREDO SMSA			
Webb County; population 72,859			
Urban building permits (dollars)	626,445	174	47
Bank debits, seas. adj. ($1,000)	103,336	5	15
Nonfarm employment	25,800	**	3
Manufacturing employment	1,540	– 2	4
Unemployed (percent)	9.2	– 12	– 2
LONGVIEW-KILGORE-GLADEWATER METROPOLITAN AREA			
Gregg County; population 75,929			
Urban building permits (dollars)	2,206,900	21	7
Bank debits ($1,000)	144,510	2	15
Nonfarm employment	36,100	**	1
Manufacturing employment	10,670	1	2
Unemployed (percent)	4.7	– 6	– 2
(Building permits and bank debits are included for those portions of Kilgore and Gladewater in Rusk County and Upshur County.)			
LUBBOCK SMSA			
Lubbock County; population 179,295			
Urban building permits (dollars)	4,183,923	3	– 6
Bank debits, seas. adj. ($1,000)	466,153	3	– 9
Nonfarm employment	69,200	**	5
Manufacturing employment	7,690	– 3	**
Unemployed (percent)	3.0	– 12	– 17
McALLEN-PHARR-EDINBURG SMSA			
Hidalgo County; population 181,535			
Urban building permits (dollars)	2,979,193	30	23
Bank debits, seas. adj. ($1,000)	212,565	9	48
Nonfarm employment	42,800	2	2
Manufacturing employment	3,650	– 2	16
Unemployed (percent)	7.5	6	1
MIDLAND SMSA			
Midland County; population 65,433			
Urban building permits (dollars)	3,109,643	378	436
Bank debits, seas. adj. ($1,000)	200,491	15	11
Nonfarm employment	61,900	**	**
Manufacturing employment	5,530	1	1
Unemployed (percent)	3.6	– 16	– 12
(Employment data are reported for the combined Midland and Odessa SMSA's since employment figures for Midland and Ector Counties, composing one labor-market area, are recorded in combined form by the Texas Employment Commission.)			

Reported area and indicator	Aug 1972	Percent change from Jul 1972	Percent change from Aug 1971
ODESSA SMSA			
Ector County; population 91,805			
Urban building permits (dollars)	2,421,069	96	156
Bank debits, seas. adj. ($1,000)	153,101	– 4	5
Nonfarm employment	61,900	**	**
Manufacturing employment	5,530	1	1
Unemployed (percent)	3.6	– 16	– 12
(Employment data are reported for the combined Midland and Odessa SMSA's since employment figures for Midland and Ector Counties, composing one labor-market area, are recorded in combined form by the Texas Employment Commission.)			
SAN ANGELO SMSA			
Tom Green County; population 71,047			
Urban building permits (dollars)	993,401	6	61
Bank debits, seas. adj. ($1,000)	137,710	– 4	7
Nonfarm employment	24,100	1	1
Manufacturing employment	4,280	– 2	1
Unemployed (percent)	4.5	– 12	7
SAN ANTONIO SMSA			
Bexar and Guadalupe Counties; population 864,014			
Urban building permits (dollars)	25,792,005	89	170
Bank debits, seas. adj. ($1,000)	1,929,743	8	5
Nonfarm employment	309,500	**	2
Manufacturing employment	36,300	1	3
Unemployed (percent)	4.6	– 12	– 15
SHERMAN-DENISON SMSA			
Grayson County; population 83,225			
Urban building permits (dollars)	777,162	13	45
Bank debits, seas. adj. ($1,000)	112,125	10	13
(Monthly employment reports are not available for the Sherman-Denison SMSA.)			
TEXARKANA SMSA			
Bowie County, Texas, and Miller County, Arkansas; population 101,198			
Urban building permits (dollars)	376,885	– 11	– 23
Bank debits, seas. adj. ($1,000)	150,645	2	14
Nonfarm employment	40,350	1	1
Manufacturing employment	8,800	**	– 4
Unemployed (percent)	5.4	– 13	– 5
(Since the Texarkana SMSA includes Bowie County in Texas and Miller County in Arkansas, all data, including population, refer to the two-county region.)			
TYLER SMSA			
Smith County; population 97,096			
Urban building permits (dollars)	1,658,512	198	– 35
Bank debits, seas. adj. ($1,000)	261,649	13	26
Nonfarm employment	41,200	**	5
Manufacturing employment	13,120	**	8
Unemployed (percent)	4.8	7	2
WACO SMSA			
McLennan County; population 147,553			
Urban building permits (dollars)	3,983,619	– 12	307
Bank debits, seas. adj. ($1,000)	382,644	20	23
Nonfarm employment	58,600	**	1
Manufacturing employment	12,580	**	4
Unemployed (percent)	4.8	– 4	2
WICHITA FALLS SMSA			
Archer and Wichita Counties; population 127,621			
Urban building permits (dollars)	2,604,593	143	49
Bank debits, seas. adj. ($1,000)	240,455	– 2	2
Nonfarm employment	42,850	**	1
Manufacturing employment	5,400	2	7
Unemployed (percent)	3.3	– 13	**

** Absolute change is less than one half of 1 percent.
Urban building-permit data are preliminary and subject to revision.

INDICATORS OF LOCAL BUSINESS CONDITIONS FOR INDIVIDUAL MUNICIPALITIES
AUGUST 1972

COUNTY City	Population	Urban building permits: Aug 1972 (dollars)	Percent change from Jul 1972	Percent change from Aug 1971	Bank debits: Aug 1972 (thousands of dollars)	Percent change from Jul 1972	Percent change from Aug 1971
ANDERSON	27,789						
Palestine	14,525	132,640	67	148	24,444	2	13
ANDREWS	10,372						
Andrews	8,625	45,850	89	− 67	9,157	2	2
ANGELINA	49,349						
Lufkin	23,049	570,425	− 18	− 10	...	...	...
ARANSAS	8,902						
Aransas Pass	5,813	62,187	− 90	− 95	14,973	− 4	11
ATASCOSA	18,696						
Pleasanton	5,407	...	...	...	8,259	31	45
AUSTIN	13,831						
Bellville	2,371	25,400	...	− 64	9,710	12	17
BAILEY	8,487						
Muleshoe	4,525	...	...	...	17,188	8	11
BASTROP	17,297						
Smithville	2,959	61,837	− 28	203	2,924	− 1	4
BEE	22,737						
Beeville	13,506	135,850	91	− 21	24,566	14	11
BELL	124,483						
(In Killeen-Temple SMSA)							
Bartlett	1,622	...	...	...	2,583	42	55
Belton	8,696	201,500	78	71	...	...	...
Harker Heights	4,216	388,807	95	142	...	...	...
Killeen	35,507	2,135,553	34	58	40,806	7	− 5
Temple	33,431	2,971,646	192	482	89,427	8	28
BEXAR	830,460						
(In San Antonio SMSA)							
San Antonio	654,153	25,384,439	96	182	1,930,836	7	12
BOWIE	67,813						
(In Texarkana SMSA)							
Texarkana	52,179	366,885	− 3	− 24	138,483	− 2	14
BRAZORIA	108,312						
(In Houston SMSA)							
Angleton	9,770	32,800	− 72	− 19	23,291	15	26
Clute	6,023	...	...	...	6,290	2	− 2
Freeport	11,997	101,975	441	251	40,166	11	18
Pearland	6,444	603,200	− 1	58	10,177	13	21
BRAZOS	57,978						
(Constitutes Bryan-College Station SMSA)							
Bryan	33,719	2,632,050	429	365	96,294	− 3	10
College Station	17,676	676,680	295	46	14,506	5	20
BREWSTER	7,780						
Alpine	5,971	61,099	820	...	6,980	2	34
BROWN	25,877						
Brownwood	17,368	137,650	108	− 28	...	...	...
BURLESON	9,999						
Caldwell	2,308	...	...	...	4,391	− 10	− 9
BURNET	11,420						
Marble Falls	2,209	...	...	...	8,914	− 9	18
CALDWELL	21,178						
Lockhart	6,489	132,225	3	− 33	11,964	21	28
CAMERON	140,368						
(Constitutes Brownsville-Harlingen-San Benito SMSA)							
Brownsville	52,522	955,562	− 38	− 55	91,168	21	20
Harlingen	33,503	1,124,560	97	96	134,799	35	18
La Feria	2,642	1,800	17	260	3,196	20	6
Los Fresnos	1,297	...	...	...	3,584	57	**
Port Isabel	3,067	90,500	...	...	7,838	45	88
San Benito	15,176	24,358	− 39	− 11	11,420	15	12

COUNTY City	Population	Urban building permits Aug 1972 (dollars)	Percent change from Jul 1972	Aug 1971	Bank debits Aug 1972 (thousands of dollars)	Percent change from Jul 1972	Aug 1971
CASTRO	10,394						
Dimmitt	4,327	...	...	...	30,398	12	30
CHEROKEE	32,008						
Jacksonville	9,734	143,050	– 22	105	30,670	– 3	13
COLEMAN	10,288						
Coleman	5,608	46,550	99	– 36	...	...	...
COLLIN	66,920						
(In Dallas SMSA)							
McKinney	15,193	81,730	– 75	– 95	16,500	– 16	5
Plano	17,872	4,381,301	74	177	28,498	1	59
COLORADO	17,638						
Eagle Lake	3,587	...	...	...	7,176	45	7
COMAL	24,165						
New Braunfels	17,859	924,389	51	22	29,934	– 9	19
COOKE	23,471						
Gainesville	13,830	128,300	77	– 67	26,643	2	35
Muenster	1,411	65,500	212	264	4,003	– 7	2
CORYELL	35,311						
(In Killeen-Temple SMSA)							
Copperas Cove	10,818	1,510,890	9	125	6,725	13	50
Gatesville	4,683	...	...	...	11,891	5	20
CRANE	4,172						
Crane	3,427	56,000	115	192	2,452	– 9	– 2
DALLAS	1,327,321						
(In Dallas SMSA)							
Carrollton	13,855	3,314,340	87	– 6	23,403	13	37
Dallas	844,401	23,531,670	42	– 41	11,968,777	10	17
Farmers Branch	27,492	1,704,974	37	91	27,705	4	13
Garland	81,437	3,736,988	– 29	– 54	86,123	11	17
Grand Prairie	50,904	4,460,506	23	84	41,280	13	14
Irving	97,260	2,642,085	35	21	108,395	19	18
Lancaster	10,522	462,229	– 54	– 1	10,391	15	16
Mesquite	55,131	1,025,830	22	– 54	32,415	14	21
Richardson	48,582	4,735,392	116	149	93,725	– 17	51
Seagoville	4,390	297,128	82	...	8,833	4	16
DAWSON	16,604						
Lamesa	11,559	3,080	– 55	– 81	26,724	8	4
DEAF SMITH	18,999						
Hereford	13,414	299,300	245	– 36	...	...	...
DENTON	75,633						
(In Dallas SMSA)							
Denton	39,874	1,968,755	106	50	87,861	16	31
Justin	741	39,650	230	2	1,698	11	16
Lewisville	9,264	...	...	...	32,230	31	76
Pilot Point	1,663	98,300	237	275	4,130	– 6	22
DE WITT	18,660						
Yoakum	5,755	9,150	– 91	– 95	16,515	15	23
EASTLAND	18,092						
Cisco	4,160	...	...	...	6,177	8	27
ECTOR	91,805						
(Constitutes Odessa SMSA)							
Odessa	78,380	2,421,069	96	156	159,529	5	19
ELLIS	46,638						
(In Dallas SMSA)							
Ennis	11,046	...	...	...	15,811	6	48
Midlothian	2,322	134,300	181	...	3,653	33	24
Waxahachie	13,452	226,350	66	88	25,780	13	33
EL PASO	359,291						
(Constitutes El Paso SMSA)							
El Paso	322,261	9,010,818	– 31	– 2	871,464	13	33
ERATH	18,191						
Stephenville	9,277	191,550	– 4	72	18,363	2	14

COUNTY City	Population	Urban building permits: Aug 1972 (dollars)	Percent change from Jul 1972	Percent change from Aug 1971	Bank debits: Aug 1972 (thousands of dollars)	Percent change from Jul 1972	Percent change from Aug 1971
FANNIN	22,705						
Bonham	7,698	182,397	228	155	17,012	17	34
FAYETTE	17,650						
Schulenburg	2,294	6,000	– 77	– 80	...	...	...
FORT BEND (In Houston SMSA)	52,314						
Richmond	5,777	323,408	273	99	12,921	3	13
Rosenberg	12,098	445,895	– 30	230	10,919	– 7	3
GAINES	11,593						
Seagraves	2,440	1,600	– 27	– 99	3,438	– 5	– 21
Seminole	5,007	2,075,103	...	...	10,985	5	4
GALVESTON (Constitutes Galveston-Texas City SMSA)	169,812						
Dickinson	10,776	...	...	...	18,415	8	20
Galveston	61,809	732,078	221	130	178,450	19	16
La Marque	16,131	54,300	– 62	199	19,189	5	– 7
Texas City	38,908	646,930	101	– 32	41,980	4	29
GILLESPIE	10,553						
Fredericksburg	5,326	66,100	– 27	– 18	22,060	– 3	29
GONZALES	16,375						
Nixon	1,925	3,200	– 60	– 71	...	...	...
GRAY	26,949						
Pampa	21,726	48,450	– 53	– 10	42,209	8	5
GRAYSON (Constitutes Sherman-Denison SMSA)	83,225						
Denison	24,923	317,240	118	46	33,055	5	12
Sherman	29,061	394,922	– 26	37	66,718	5	18
GREGG (Constitutes Longview-Kilgore-Gladewater Metropolitan Area)	75,929						
Gladewater	5,574	23,800	– 83	– 85	6,598	– 7	– 7
Kilgore	9,495	586,100	314	556	26,031	17	32
Longview	45,547	1,597,000	3	– 12	111,881	**	13
GUADALUPE (In San Antonio SMSA)	33,554						
Schertz	4,061	367,000	– 65	848	1,991	– 6	65
Seguin	15,934	...	...	...	31,524	9	32
HALE	34,137						
Hale Center	1,964	0	...	...	...	...	...
Plainview	19,096	731,475	803	41	70,086	11	16
HARDEMAN	6,795						
Quanah	3,948	33,000	...	...	6,897	– 3	24
HARDIN	29,996						
Silsbee	7,271	...	...	...	15,025	5	18
HARRIS (In Houston SMSA)	1,741,912						
Baytown	43,980	1,625,363	– 61	138	74,693	7	5
Bellaire	19,009	295,491	60	25	78,740	2	23
Deer Park	12,773	...	...	...	15,505	– 1	13
Houston	1,232,802	55,055,149	– 15	– 8	11,361,341	6	27
Humble	3,278	198,500	– 11	– 90	13,575	4	15
La Porte	7,149	250,697	– 78	16	4,915	– 1	5
Pasadena	89,277	773,292	– 75	– 96	155,630	19	21
Tomball	2,734	...	...	...	21,522	– 6	15
HARRISON	44,841						
Hallsville	1,038	...	...	...	2,010	20	55
Marshall	22,937	240,770	135	118	33,714	12	15
HASKELL	8,512						
Haskell	3,655	294,400	841	990	5,891	– 14	14
HAYS	27,642						
San Marcos	18,860	197,930	276	– 62	16,566	1	**

COUNTY City	Population	Urban building permits: Aug 1972 (dollars)	Percent change from Jul 1972	Percent change from Aug 1971	Bank debits: Aug 1972 (thousands of dollars)	Percent change from Jul 1972	Percent change from Aug 1971
HENDERSON	26,466						
Athens	9,582	247,500	– 10	15	23,861	7	26
HIDALGO (Constitutes McAllen-Pharr-Edinburg SMSA)	181,535						
Alamo	4,291	. . .	. . .	. . .	4,518	7	30
Donna	7,365	10,568	– 71	– 67	5,224	2	7
Edinburg	17,163	1,510,619	295	386	34,056	6	**
Elsa	4,400	4,475	8	– 65	7,967	77	46
McAllen	37,636	904,355	8	– 39	72,987	6	35
Mercedes	9,355	71,700	172	– 22	12,580	34	11
Mission	13,043	162,611	62	161	24,027	– 7	12
Pharr	15,829	167,897	321	315	7,968	12	7
San Juan	5,070	9,050	– 74	– 25	5,304	10	29
Weslaco	15,313	135,818	– 83	– 62	19,904	6	7
HOCKLEY	20,396						
Levelland	11,445	. . .	. . .	. . .	29,442	16	20
HOOD	6,368						
Granbury	2,473	. . .	. . .	. . .	3,954	– 2	24
HOPKINS	20,710						
Sulphur Springs	10,642	302,325	53	– 5	34,513	3	24
HOWARD	37,796						
Big Spring	28,735	33,615	– 87	– 75	66,745	– 1	10
HUNT	47,948						
Greenville	22,043	464,400	. . .	241	31,635	– 1	10
HUTCHINSON	24,443						
Borger	14,195	10,500	– 64	73	. . .	. . .	. . .
JACKSON	12,975						
Edna	5,332	100,130	12	210	9,899	– 10	– 15
JASPER	24,692						
Jasper	6,251	142,500	147	533	22,030	**	18
Kirbyville	1,869	. . .	. . .	. . .	2,590	– 20	– 22
JEFFERSON (In Beaumont-Port Arthur-Orange SMSA)	244,773						
Beaumont	115,919	1,306,593	– 23	– 20	362,532	6	7
Groves	18,067	340,175	– 11	– 33	22,914	4	22
Nederland	16,810	192,432	144	165	15,231	– 3	26
Port Arthur	57,371	460,360	– 35	– 3	92,210	**	– 11
Port Neches	10,894	265,037	. . .	– 17	20,699	8	16
JIM WELLS	33,032						
Alice	20,121	1,441,977	114	980	53,951	– 3	25
JOHNSON (In Fort Worth SMSA)	45,769						
Burleson	7,713	120,600	– 19	. . .	9,816	– 1	33
Cleburne	16,015	155,400	– 52	4	28,277	7	19
KARNES	13,462						
Karnes City	2,926	15,825	441	– 9	4,901	– 4	. . .
KAUFMAN (In Dallas SMSA)	32,392						
Terrell	14,182	131,800	– 26	– 55	. . .	. . .	. . .
KIMBLE	3,904						
Junction	2,654	. . .	. . .	. . .	3,714	9	20
KLEBERG	33,166						
Kingsville	28,711	1,337,760	448	209	28,714	2	6
LAMAR	36,062						
Paris	23,441	1,942,967	602	. . .	. . .	. . .	. . .
LAMB	17,770						
Littlefield	6,738	3,200	. . .	– 71	12,866	23	4
LAMPASAS	9,323						
Lampasas	5,922	229,835	286	591	14,986	9	26

COUNTY City	Population	Urban building permits: Aug 1972 (dollars)	Percent change from Jul 1972	Percent change from Aug 1971	Bank debits: Aug 1972 (thousands of dollars)	Percent change from Jul 1972	Percent change from Aug 1971
LAVACA	17,903						
Hallettsville	2,712	2,131	– 77	– 93	5,749	– 3	13
Yoakum	5,755	9,150	– 91	– 95	16,515	15	23
LEE	8,048						
Giddings	2,783	96,500	– 6	170	8,679	**	21
LIBERTY	33,014						
(In Houston SMSA)							
Dayton	3,804	17,425	– 23	– 67	9,142	4	16
Liberty	5,591	128,770	38	310	18,474	18	25
LIMESTONE	18,100						
Mexia	5,943	64,550	64	140	11,680	– 1	23
LLANO	6,979						
Kingsland	1,262	...	...	...	7,600	6	3
Llano	2,608	61,500	...	64	8,681	13	6
LUBBOCK	179,295						
(Constitutes Lubbock SMSA)							
Lubbock	149,101	4,156,773	2	– 6	428,848	5	9
Slaton	6,583	27,150	...	4	8,169	18	29
LYNN	9,107						
Tahoka	2,956	52,500	263	...	8,576	31	– 9
MC CULLOCH	8,571						
Brady	5,557	33,100	– 91	– 65	13,537	21	44
MC LENNAN	147,553						
(Constitutes Waco SMSA)							
McGregor	4,365	63,550	203	213	8,741	26	49
Waco	95,326	3,697,329	– 14	303	350,320	15	25
MATAGORDA	27,913						
Bay City	11,733	113,663	113	454	34,320	31	29
MAVERICK	18,093						
Eagle Pass	15,364	162,861	74	– 88	14,510	– 4	– 2
MEDINA	20,249						
Castroville	1,893	...	...	...	1,994	7	29
Hondo	5,487	5,970	– 89	– 91	...	...	...
MIDLAND	65,433						
(Constitutes Midland SMSA)							
Midland	59,463	3,109,643	378	436	188,219	9	8
MILAM	20,028						
Cameron	5,546	...	...	...	10,867	10	13
Rockdale	4,655	6,809	– 88	– 49	9,907	22	21
MILLS	4,212						
Goldthwaite	1,693	...	...	...	8,925	1	31
MITCHELL	9,073						
Colorado City	5,227	...	...	...	8,479	**	29
MONTGOMERY	49,479						
(In Houston SMSA)							
Conroe	11,969	1,229,700	– 17	615	60,421	9	24
MOORE	14,060						
Dumas	9,771	238,825	– 5	53	...	...	...
NACOGDOCHES	36,362						
Nacogdoches	22,544	510,765	– 61	32	...	...	...
NAVARRO	31,150						
Corsicana	19,972	440,855	138	...	43,140	13	22
NOLAN	16,220						
Sweetwater	12,020	64,870	10	713	26,264	– 2	12
NUECES	237,544						
(In Corpus Christi SMSA)							
Bishop	3,466	...	...	...	2,650	– 10	– 20
Corpus Christi	204,525	5,500,538	17	10	544,901	5	16
Robstown	11,217	90,955	47	– 30	30,537	14	14

COUNTY City	Population	Urban building permits: Aug 1972 (dollars)	Percent change from Jul 1972	Percent change from Aug 1971	Bank debits: Aug 1972 (thousands of dollars)	Percent change from Jul 1972	Percent change from Aug 1971
ORANGE	71,170						
(In Beaumont-Port Arthur-Orange SMSA)							
Orange	24,457	114,102	– 67	– 37	61,971	5	18
PALO PINTO	28,962						
Mineral Wells	18,411	91,471	– 15	161	31,801	– 2	6
PANOLA	15,894						
Carthage	5,392	16,472	– 62	– 34	6,914	11	17
PARKER	33,888						
Weatherford	11,750	633,600	. . .	69	31,661	– 4	13
PARMER	10,509						
Friona	3,111	91,400	166	203	32,079	– 6	48
PECOS	13,748						
Fort Stockton	8,283	85,400	– 52	**	12,877	2	14
POTTER	90,511						
(In Amarillo SMSA)							
Amarillo	127,010	4,415,315	2	230	640,769	2	25
RANDALL	53,885						
(In Amarillo SMSA)							
Amarillo (See Potter)							
Canyon	8,333	85,878	– 61	2	14,121	**	30
REEVES	16,526						
Pecos	12,682	43,000	11	138	27,461	3	13
REFUGIO	9,494						
Refugio	4,340	0	. . .	. . .	5,607	2	18
RUSK	34,102						
Henderson	10,187	717,588	323	168	27,835	16	29
Kilgore	9,495	586,100	314	556	26,031	17	32
SAN PATRICIO	47,288						
(In Corpus Christi SMSA)							
Aransas Pass	5,813	62,187	– 90	– 95	14,973	– 4	11
Sinton	5,563	153,900	– 1	. . .	14,652	12	22
SAN SABA	5,540						
San Saba	2,555	0	. . .	. . .	10,112	– 15	22
SCURRY	15,760						
Snyder	11,171	108,300	– 80	– 24	22,903	– 3	8
SHACKELFORD	3,323						
Albany	1,978	0	. . .	. . .	3,403	– 2	– 13
SHERMAN	3,657						
Stratford	2,139	72,750	142	31	17,893	3	20
SMITH	97,096						
(Constitutes Tyler SMSA)							
Tyler	57,770	1,643,512	206	– 36	244,654	9	31
STEPHENS	8,414						
Breckenridge	5,944	17,826	– 48	– 98	. . .	. . .	. . .
SUTTON	3,175						
Sonora	2,149	6,025	– 66	– 91	4,588	2	50
TARRANT	716,317						
(In Fort Worth SMSA)							
Arlington	90,643	6,461,260	4	– 8	130,795	7	16
Burleson	7,713	120,600	– 19	. . .	9,816	– 1	33
Euless	19,316	85,806	. . .	– 83	. . .	. . .	. . .
Fort Worth	393,476	7,837,738	– 26	– 2	2,313,173	8	11
Grapevine	7,023	361,150	194	– 39	13,233	26	45
North Richland Hills	16,514	. . .	. . .	. . .	24,459	11	35
White Settlement	13,449	151,492	– 22	550	9,918	7	51
TAYLOR	97,853						
(In Abilene SMSA)							
Abilene	89,653	2,648,876	49	384	190,683	3	15

COUNTY City	Population	Urban building permits Aug 1972 (dollars)	Percent change from Jul 1972	 Aug 1971	Bank debits Aug 1972 (thousands of dollars)	Percent change from Jul 1972	 Aug 1971
TERRY	14,118						
Brownfield	9,647	232,250	172	...	...	...	...
TITUS	16,702						
Mount Pleasant	8,877	74,075	7	– 84	...	...	...
TOM GREEN	71,047						
(Constitutes San Angelo SMSA)							
San Angelo	63,884	993,401	6	61	137,012	– 8	9
TRAVIS	295,516						
(Constitutes Austin SMSA)							
Austin	251,808	19,297,796	11	100	1,121,658	17	11
UPSHUR	20,976						
Gladewater	5,574	23,800	– 83	– 85	6,598	– 7	– 7
UPTON	4,697						
McCamey	2,647	...	...	...	2,166	– 2	1
UVALDE	17,348						
Uvalde	10,764	260,460	64	19	28,793	1	17
VAL VERDE	27,471						
Del Rio	21,330	336,260	– 74	181	28,305	6	27
VICTORIA	53,766						
Victoria	41,349	739,002	– 22	29	127,582	– 2	16
WALKER	27,680						
Huntsville	17,610	138,500	– 88	– 74	28,520	– 14	14
WARD	13,019						
Monahans	8,333	4,750	– 67	375	12,236	– 13	– 3
WASHINGTON	18,842						
Brenham	8,922	152,345	– 28	25	28,336	– 2	14
WEBB	72,859						
(Constitutes Laredo SMSA)							
Laredo	69,024	626,445	174	47	103,903	5	24
WHARTON	36,729						
El Campo	8,563	...	...	...	30,270	21	1
WICHITA	121,862						
(In Wichita Falls SMSA)							
Burkburnett	9,230	85,275	434	...	11,032	– 3	14
Iowa Park	5,796	3,725	– 92	59	4,857	5	13
Wichita Falls	97,564	2,515,593	149	44	225,273	**	13
WILBARGER	15,355						
Vernon	11,454	94,975	9	140	33,731	15	49
WILLACY	15,570						
Raymondville	7,987	236,900	365	272	23,297	5	6
WILLIAMSON	37,305						
Bartlett	1,622	...	...	...	2,583	42	55
Georgetown	6,395	228,900	– 68	...	14,348	– 11	36
Taylor	9,616	160,370	– 4	– 1	18,259	7	23
WINKLER	9,640						
Kermit	7,884	1,567	– 91	...	...	...	...
WISE	19,687						
Decatur	3,240	295,900	770	...	7,159	2	31
YOUNG	15,400						
Graham	7,477	104,700	31	– 69	18,187	– 4	12
Olney	3,624	879,900	...	...	8,820	– 6	35
ZAVALA	11,370						
Crystal City	8,104	13,545	10	41	9,817	18	18

** Absolute change is less than one half of 1 percent.
... No data, or inadequate basis for reporting.

BAROMETERS OF TEXAS BUSINESS

(All figures are for Texas unless otherwise indicated.)

All indexes are based on the average months for 1967=100 except where other specification is made; all except annual indexes are adjusted for seasonal variation unless otherwise noted. Employment estimates are compiled by the Texas Employment Commission in cooperation with the Bureau of Labor Statistics of the U.S. Department of Labor. The symbols used below impose qualifications as indicated here: p–preliminary data subject to revision; r–revised data; *–dollar totals for the fiscal year to date; †–employment data for wage and salary workers only.

	Aug 1972	Jul 1972	Aug 1971	Year-to-date average 1972	Year-to-date average 1971
GENERAL BUSINESS ACTIVITY					
Estimates of personal income (millions of dollars, seasonally adjusted)	$ 3,936[p]	$ 3,836[p]	$ 3,526[r]	$ 3,823	$ 3,515
Income payments to individuals in U.S. (billions, at seasonally adjusted annual rate)	$ 939.8[p]	$ 932.9[p]	$ 869.1[r]	$ 918.4	$ 850.2
Wholesale prices in U.S. (unadjusted index)	119.9	119.7	114.9	118.1	113.6
Consumer prices in Dallas (unadjusted index)	125.5	...	122.7	124.6	121.0
Consumer prices in U.S. (unadjusted index)	125.7	125.5	122.1	124.5	120.6
Business failures (number)	...	58	69	...	62
Business failures (liabilities, thousands)	$ ...	$ 3,601	$ 12,491	$ ...	$ 11,056
Sales of ordinary life insurance (index)	170.4	149.9	153.6	161.7	144.7
PRODUCTION					
Total electric-power use (index)	151.8[p]	149.1[p]	133.7[r]	151.7	136.0
Industrial electric-power use (index)	137.3[p]	135.6[p]	124.4[r]	138.3	126.0
Crude-oil production (index)	112.1[p]	121.8[p]	105.3[r]	115.0	112.0
Average daily production per oil well (bbl.)	18.8	19.8	17.5	19.0	18.0
Crude-oil runs to stills (index)	116.9	116.1	112.5	115.5	112.7
Industrial production in U.S. (index)	114.3[p]	113.7[p]	105.6[r]	111.9	106.2
Texas industrial production–total (index)	131.4[p]	133.0[p]	120.9[r]	129.4	121.1
Texas industrial production–total manufactures (index)	133.7[p]	134.3[p]	123.1[r]	131.4	121.7
Texas industrial production–durable manufactures (index)	142.2[p]	142.3[p]	132.2[r]	140.7	131.3
Texas industrial production–nondurable manufactures (index)	127.5[p]	128.5[p]	116.6[r]	124.1	114.8
Texas industrial production–mining (index)	120.8[p]	124.1[p]	111.2[r]	118.4	114.5
Texas industrial production–utilities (index)	150.9[p]	155.8[p]	138.0[r]	155.2	140.1
Urban building permits issued (index)	177.9	158.6	170.2	183.8	152.8
New residential building authorized (index)	216.3	160.3	182.7	203.0	170.0
New residential units authorized (index)	197.1	138.0	161.5	165.1	161.3
New nonresidential building authorized (unadjusted index)	148.3	156.6	161.3	170.2	135.3
AGRICULTURE					
Prices received by farmers (unadjusted index, 1910-14=100)	349	356	323	339	305
Prices paid by farmers in U.S. (unadjusted index, 1910-14=100)	433	433	412	428	408
Ratio of Texas farm prices received to U.S. prices paid by farmers	81	82	78	79	75
FINANCE					
Bank debits (index)	206.1	191.3	172.5	192.8	168.2
Bank debits, U.S. (index)	...	191.6	178.2[r]	...	170.4
Bank commercial loans outstanding (index)	138.1	135.7	128.8	129.9	123.3
Reporting member banks, Dallas Federal Reserve District					
Loans (millions)	$ 8,146	$ 8,075	$ 6,897	$ 7,788	$ 6,774
Loans and investments (millions)	$ 11,775	$ 11,738	$ 10,013	$ 11,353	$ 9,883
Adjusted demand deposits (millions)	$ 3,946	$ 3,850	$ 3,660	$ 3,787	$ 3,559
Revenue receipts of the state comptroller (thousands)	$ 449,335	$ 282,509	$ 410,529	$ 366,013	$ 315,267
Federal Internal Revenue collections (thousands)	$ 758,594	$ 365,497	$ 655,527	$1,124,091*	$ 990,276*
Securities registrations–original applications					
Mutual investment companies (thousands)	$ 39,543	$ 20,444	$ 23,525	$ 325,431*	$ 267,692*
All other corporate securities					
Texas companies (thousands)	$ 48,770	$ 6,800	$ 12,507	$ 295,605*	$ 205,298*
Other companies (thousands)	$ 34,954	$ 41,281	$ 26,822	$ 471,855*	$ 296,381*
Securities registration–renewals					
Mutual investment companies (thousands)	$ 57,136	$ 23,657	$ 18,582	$ 452,766*	$ 450,718*
Other corporate securities (thousands)	$ 0	$ 0	$ 376	$ 23,781*	$ 17,862*
LABOR					
Total nonagricultural employment in Texas (index)†	115.9[p]	115.7[p]	114.8[r]	115.5	112.7
Manufacturing employment in Texas (index)†	108.3[p]	107.3[p]	106.4[r]	108.4	107.1
Average weekly hours–manufacturing (index)†	98.7[p]	98.9[p]	97.7[r]	98.9	98.0
Average weekly earnings–manufacturing (index)†	129.4[p]	129.2[p]	123.0[r]	128.7	121.8
Total nonagricultural employment (thousands)†	3,786.3[p]	3,783,3[p]	3,671.5[r]	3,751.1	3,650.9
Total manufacturing employment (thousands)†	724.6[p]	723.1[p]	711.9[r]	720.7	711.7
Durable-goods employment (thousands)†	385.7[p]	383.9[p]	377.2[r]	382.3	378.2
Nondurable-goods employment (thousands)†	338.9[p]	339.2[p]	334.7[r]	338.3	333.5
Percent of total labor force unemployed	3.8	4.4	4.4	3.9	4.3
Total civilian labor force in selected labor-market areas (thousands)	3,626.1	3,638.0	3,530.2	3,603.8	3,515.4
Nonagricultural employment in selected labor-market areas (thousands)	3,401.6	3,399.7	3,292.6	3,378.1	3,282.2
Manufacturing employment in selected labor-market areas (thousands)	604.0	601.0	586.6	599.1	590.6
Total unemployment in selected labor-market areas (thousands)	146.1	159.2	157.3	145.4	150.9
Percent of labor force unemployed in selected labor-market areas	4.0	4.4	4.5	4.0	4.3

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