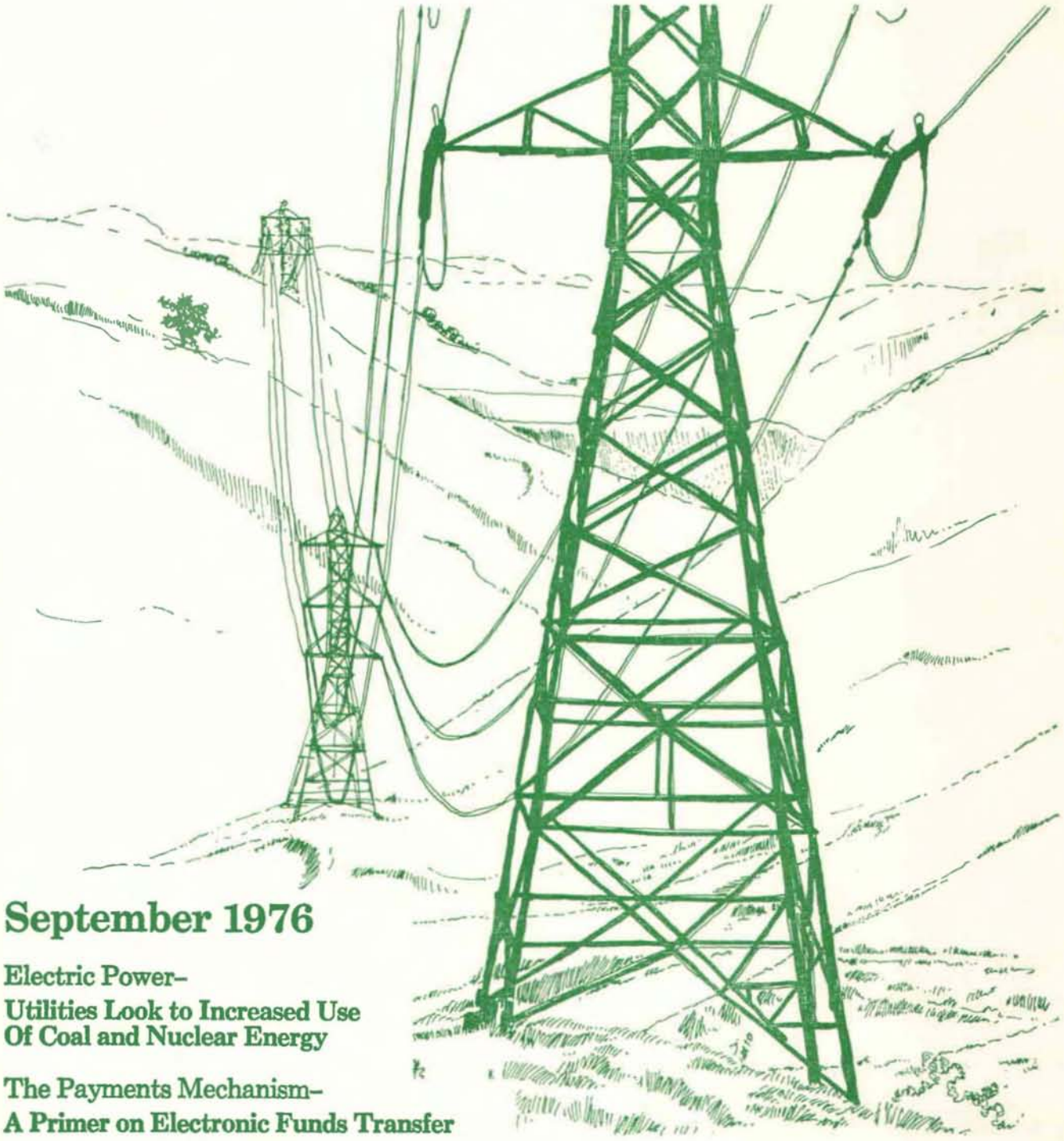
Federal Reserve Bank of Dallas

Business Review



September 1976

Electric Power–
Utilities Look to Increased Use Of Coal and Nuclear Energy

The Payments Mechanism–
A Primer on Electronic Funds Transfer

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Electric Power–

Utilities Look to Increased Use Of Coal and Nuclear Energy

Texas once had the cheapest boiler fuel of any state, allowing the generation of inexpensive electric power. Ready supplies of natural gas that had few alternative markets provided the state's electric utilities with their primary boiler fuel. But natural gas is no longer a low-cost boiler fuel for these utilities.

Prices of natural gas escalated sharply following the Arab oil embargo in late 1973 to levels that make it uneconomical as a boiler fuel. And with a growing demand for natural gas pressing against a dwindling supply, the Texas Railroad Commission has ruled that electric utilities must begin to curtail their consumption by the 1980's. At present, there are three feasible substitutes for natural gas as a primary boiler fuel–lignite, western coal, and nuclear energy.

With a growing demand for natural gas pressing against a dwindling supply, the Texas Railroad Commission has ruled that electric utilities must begin to curtail their consumption by the 1980's.

The least expensive fuel in the state is lignite, a low-ranking form of coal that is currently being burned by three utilities. Other firms, seeing the cost advantages in burning lignite, are moving to construct lignite-fired boiler plants where reserves are available. But the lignite deposits are not large enough to meet all the demands in the state.

Because Texas coal would be expensive to mine, additional supplies of coal will be imported from the vast reserves located in the western states. But transporting coal into Texas also presents major investment decisions. In the near term, railroad facilities would have to be expanded in order to haul the western coal. And in the longer run, coal slurry pipelines might have to be built to help meet the needs of the state's electric utilities.

Nuclear power plants are much bigger and more costly than coal-fired plants. But the advantage of nuclear energy is that it shows promise of holding the average total cost of generating electricity below the generating cost of coal-fired plants.

Natural gas as a boiler fuel

Texas has long been the nation's leading producer of natural gas. The ready availability of low-cost gas led the state's electric utilities to build gas-fired steam plants to generate electricity. In fact, natural gas became the most widely used boiler fuel, accounting for almost all the fuel consumed by the state's utilities.

The fixed investment a gas-fired boiler requires is relatively small, as natural gas is virtually pollution-free. The only waste products given off during combustion are carbon dioxide and water. Because natural gas is the cleanest burning fuel, no investment in pollution-control equipment is required. Use of other fuels, such as coal, entails not only the basic cost of the boiler but also sizable investments in equipment to clean flue gases.

Because gas is so desirable, it was the basis of much of the long-range planning of electric utilities in Texas in the late sixties, and even in the early seventies. But several factors upset those plans.

Demand for natural gas as a boiler fuel and for other uses accelerated throughout the sixties. Total gas consumption in Texas increased from 5.9 trillion cubic feet in 1960 to over 8.6 trillion in 1972. By 1974, however, gas consumption dropped to less than 8.2 trillion cubic feet because of limited supplies brought on by a decline in proved reserves.

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The squeeze forced sharply higher gas prices on the electric utility industry. And prices were pushed even higher after November 1973 as oil prices were quadrupled by the Arab oil cartel. In 1961, for example, gas as a boiler fuel cost the utilities, on average, 17.3 cents per million Btu (British thermal units). But by 1974, the state's electric utilities paid an average of 44.8 cents.

The market for gas tightened even further in 1975, as the average cost to the utility industry rose to 75.4 cents. And some companies, without prior contracts with suppliers, were forced to buy all their gas at $1.90 per million Btu in the intrastate market.

The rising price of gas in the unregulated Texas market helped stimulate new exploration, but

the state's reserves continued to shrink. And on December 17, 1975, the Texas Railroad Commission issued a ruling that large users of boiler fuel, which include the electric utilities, must cut their consumption of gas 10 percent by 1981 and an additional 15 percent by 1985.

Alternative boiler fuels

As the price of gas began rising in the late sixties, nuclear energy and lignite showed promise as substitutes for the primary boiler fuel. Supplies of these fuels were readily available, and it was generally believed their prices would remain well below the price of natural gas. While the initial fixed investment in boiler facilities using lignite or nuclear energy is much larger than for gas-fired plants, a high fixed cost amortized over a long period of time and combined with a smaller fuel bill can result in a relatively low average total cost of producing electricity.

Generating plants have become even more expensive than anticipated just a few years ago. In 1970, a gas-fired plant could be built for about $75 per kilowatt of generating capacity. A plant using lignite or bituminous coal cost about $125 per kilowatt, and one using nuclear fuel cost about $240. But it now requires about $450 per kilowatt of generating capacity to build a coal-fired plant–plus $30 to $80 per kilowatt for sulfur scrubbers–and as much as $900 per kilowatt for a nuclear-fired one.

As the price of gas began rising in the late sixties, nuclear energy and lignite showed promise as substitutes for the primary boiler fuel.

It takes about six years to license and build a coal-fired plant and 10 to 12 years for a nuclear-fired one. Uncertainty about future rates of inflation has led suppliers to the utility industry to "index" contracts. Suppliers promise to deliver equipment and materials at a future date, but the delivery price is determined by today's price plus a monthly cost adjustment that ranges, on an annual-rate basis, from 6 to 15 percent.

Two nuclear plants are currently under construction in Texas. The Comanche Peak Station is located near Glen Rose, and the South Texas Station is located in Matagorda County.

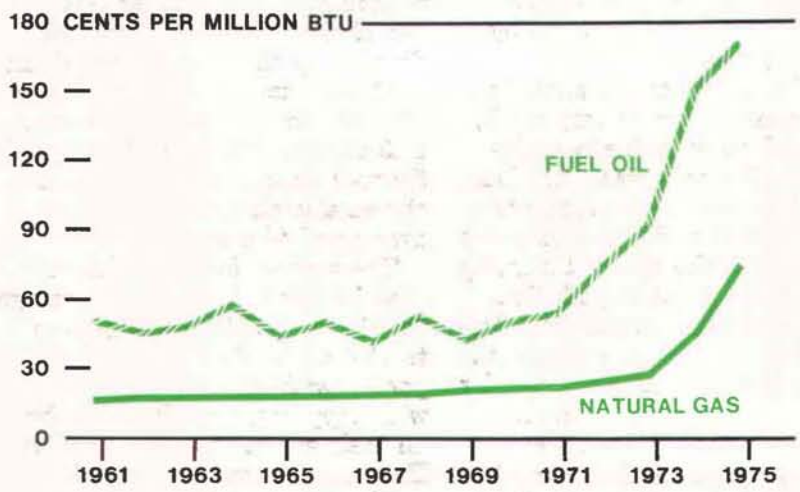
Lignite was once a widely used fuel in Texas, with annual production averaging about 1 million tons from 1914 to 1930. However, with the development of inexpensive oil and gas supplies in the state, the mining of lignite dwindled and then disappeared in the forties. But just as lignite production declined because of falling gas prices, mining of this low-grade coal revived when gas prices began rising rapidly.

Lignite is now the least expensive boiler fuel in the state. It averaged less than 22 cents per million Btu in 1971, when the first of the new lignite-fired generating stations began operating, and rose to only 24 cents by 1975. By comparison, the average price per million Btu last year was 75 cents for natural gas and $1.71 for fuel oil.

Despite the fuel cost advantage, lignite is not widely available in Texas. To date, only three utilities have acquired lignite reserves, which are found in a narrow band that stretches from Northeast Texas to the Rio Grande. Because it is more expensive to transport lignite than to transmit electricity short distances over high-power lines, the generating plants are located near the mines.

With current technology, lignite cannot be counted on to supply the long-run fuel needs of the state's electric utilities. The generating plants now operating and those that are planned will exhaust shallow-deposit reserves in 30 to 40 years. A bigger reserve of deep-basin lignite is located at depths

Rising fuel prices paid by electric utilities in Texas have stimulated search for cheaper substitutes



SOURCE: Edison Electric Institute

of 5,000 feet or more, but these deposits cannot be economically tapped at current fuel prices.

Western coal

Because lignite reserves in Texas are limited, the utilities will have to rely on coal imported from out of state as an important source of fuel. Coal reserves in the United States contain 2.6 times as much energy as all known oil reserves in the world. Most U.S. coal reserves are located in the West, and the largest and richest deposits are in Montana and Wyoming.

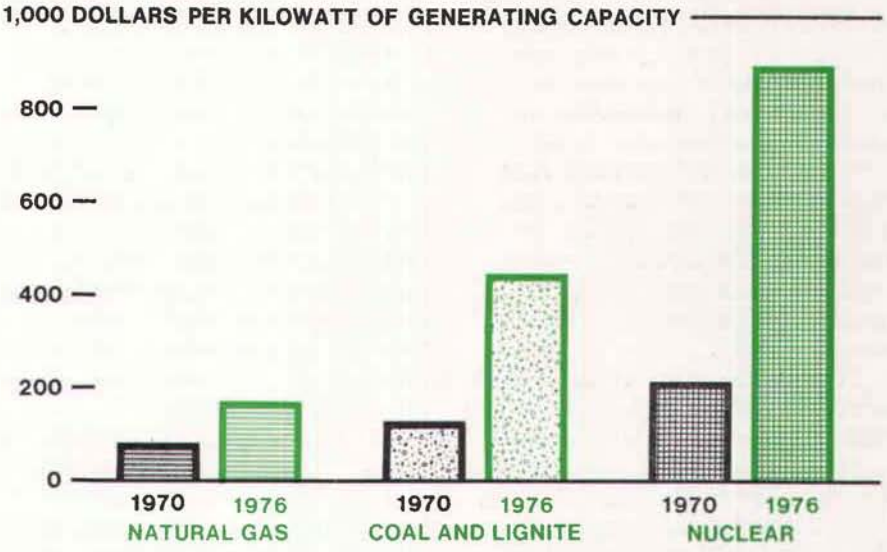
Besides being plentiful, western coal has two other distinct advantages, which more than offset the fact that its heat content averages a third less than for eastern coal. It is inexpensive to mine and has a very low sulfur content. While most eastern coal is mined underground in a relatively labor-intensive operation, western deposits lie near the earth's surface and are easily surface-mined with huge shovels. The smaller labor requirement helps make western coal much cheaper than deep-mined eastern coal.

The low sulfur content of western coal helps boiler plants meet clean air standards. The sulfur content of western coal averages about 0.7 percent, compared with 2 to 4 percent for eastern coal. Consequently, federal emission standards can be met with less investment in pollution-control equipment.

Despite the advantages, two obstacles have to be dealt with before use of western coal can be significantly increased. The first is environmental concerns, and the second is transportation.

To satisfy environmental standards, land that has been mined will have to be essentially restored to its previous state. In areas that receive little rainfall or are very hilly or mountainous, this may be difficult to accomplish because the land, once mined, would be particularly prone to erosion. But mining activity could begin in areas where rainfall and terrain are such that the land can be easily restored.

Construction costs of generating plants have risen sharply



Because lignite reserves in Texas are limited, the utilities will have to rely on coal imported from out of state as an important source of fuel.

The costs of land restoration will be paid by the mining companies. Land reclamation costs, however, will likely be a relatively small share of the total cost of producing western coal. For example, even though it may cost several thousand dollars to rehabilitate an acre of land, that expense would probably add only a few cents to the cost of mining a ton of coal.

Another major obstacle to the use of western coal as a boiler fuel in Texas involves transportation. Electric power plants could be constructed in the western coalfields and transmission lines built to bring the power to Texas. But this approach is not feasible for several reasons.

First, operation of a power plant requires large quantities of water for generating steam and for cooling, and generating capacity of the size required by the state could outrun the water supplies in many western areas. More important, the cost of building adequate transmission lines would be very high, and power losses over such long lines would be great, making energy delivered to Texas cities very expensive.

Another approach is to transport western coal to the boiler plants in Texas. While this will require huge investments in transportation equipment, the cost should be smaller than if the power plants are constructed in western coalfields. The two principal means of transportation will be railroads and slurry pipelines.

Railroads will initially be called upon to bring western coal into the state. The first shipment is from Wyoming and is scheduled to be delivered to a new coal-fired boiler

unit in San Antonio this fall. And a second coal-fired unit should be completed there by next summer.

To supply power plants with western coal will require additional investment in railroads. Existing tracks already connect Texas markets with northeastern New Mexico, southern Colorado, and other western fields. And rolling stock is available. But as more coal-fired plants are built, the demand for coal supplies will mount rapidly.

The planned conversion to western coal by utilities in the state will take an estimated annual coal supply of 25 million tons by 1985–about 70,000 tons per day. Assuming transportation via rail and that trains were made up of 100 hopper cars of 100-ton capacity, seven trainloads a day would be needed. But because of the distance between the coalfields and power plants, a train could not complete a round trip in a day, and, hence, the amount of rolling stock and trackage would have to be boosted substantially.

A number of electric utilities are planning to shoulder some of the increased investment in transportation. In fact, some have decided it will be cheaper to transport the western coal in their own hopper cars. Also, some will likely build their own spur lines connecting the main lines to the boiler plants. If so, these investments would add substantially to a utility's total capital requirements.

The cost of transporting western coal will be fairly high. One railroad has contracted to deliver coal from New Mexico, beginning in 1980, at a base rate of 20.5 cents per million Btu, with the final payment to be adjusted for inflation. Nonetheless, the utilities estimate the average total cost of generating electricity with western coal will be much cheaper than with either natural gas or fuel oil. It is likely, though, to be somewhat higher than for nuclear generation and considerably more expensive than with Texas lignite.

Two coal slurry pipelines have been proposed to transport western coal to Texas

SOURCES: U.S. Department of the Interior
Federal Reserve Bank of Dallas

Slurry pipelines

Another possible means of transporting coal is the slurry pipeline. Mixing powdered coal with water to a 50-50 consistency by weight produces a slurry that can be pumped through a pipeline from mines to power plants. A pipeline already in operation is moving coal slurry 273 miles from Black Mesa, Arizona, to a power plant at Mohave, Nevada.

Several other coal slurry pipelines have been proposed by private companies. The first project that may be undertaken is a 38-inch line running from Gillette, Wyoming, to White Bluff, Arkansas, and costing an estimated $750 million. Two pipelines are also being considered for Texas. One would run from near Walsenburg, Colorado, to Houston via Amarillo and Temple, and the other would move coal from Gillette, Wyoming, to Houston.

The cost of building a new railroad might well run twice as much as constructing a new pipeline. However, in areas where a pipeline would run parallel to existing rail lines, improving the rail lines could be cheaper–costing perhaps half what a new pipeline would.

The variable cost of operating a pipeline is lower than for a railroad, largely because less labor is required. A few workers can monitor the operation of a pipeline, but moving an equivalent amount of coal by rail requires a number of train crews. The labor cost of operating a large pipeline has been estimated at about 4 percent of the total operating cost, while the labor cost of operating a train over the same route could account for nearly half the total cost.

The construction of slurry pipelines is being held up because the railroads are not allowing pipeline companies rights-of-way across their tracks. To overcome this obstacle, pipeline companies are seeking congressional legislation that would make them public carriers and grant them the right of eminent domain. But action on such legislation apparently will not take place before next year.

After the railroads reach a level of operation that fully utilizes their present capacity, a significant part of any further expansion of transportation facilities is likely to be in the form of slurry pipelines.

Another problem is obtaining enough water to make the slurry for the pipelines. Because most western coal is in arid or semiarid areas, mixing 200 gallons of water with each ton of coal mined would strain water supplies. A large pipeline, for example, could require up to 6.5 billion gallons of water a year.

Pipeline companies propose drilling deep wells to obtain the necessary water. But environmentalists and the western states tend to oppose this, believing the water table in many mining areas would soon drop significantly. Another possibility is to pump the water separated from the slurry at the power plants back to the mines. However, only half the water in the slurry could be recovered, and building a return pipeline would add substantially to the fixed cost.

Slurry pipelines will likely provide a longer-term solution to the coal transportation problem–in some areas, at least. After the railroads reach a level of operation that fully utilizes their present capacity, a significant part of any further expansion of transportation facilities is likely to be in the form of slurry pipelines. But the availability of water would likely constrain the amount of pipeline capacity that could be built.

A solution to the water problem would be to find another fluid that could be used in slurry. Some alternatives have been proposed. One is methanol, which could be produced from coal itself. And blowing coal through pneumatic pipelines is being studied.

New capacity

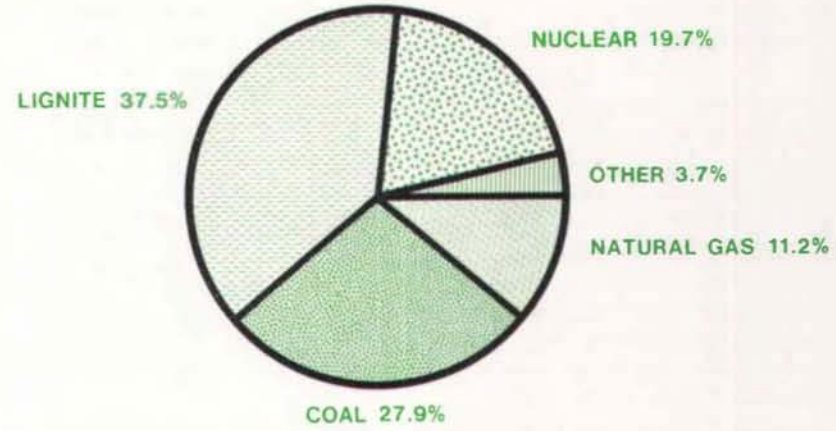
Because of the long lead times required to bring facilities into operation, plans for new generating plants between now and 1985 are already fairly well established. It is anticipated that 24,416 megawatts of new generating capacity will be built by the electric utilities making up the Electric Reliability Council of Texas.

Gas-fired plants–likely to be the last ones built in the state–will account for 11 percent of the increase in capacity, and as gas supplies dry up, they can be converted to fuel oil. More than a third of the new capacity is expected to be fueled by lignite, and 28 percent by western coal. Four generating units at the two nuclear stations will account for a fifth. The fuel for 900 megawatts of the planned generating capacity is still uncertain but could be western coal or lignite.

Because of the long lead times required to bring facilities into operation, plans for new generating plants between now and 1985 are already fairly well established.

Lignite-fired capacity is scheduled to come into operation every year beginning in 1977. The first plant to burn western coal will start operation this year, and others will follow except in 1984. Eight of the 11 coal-fired plants will be built to rely on natural gas or fuel oil as a secondary fuel

New generating capacity in Texas through 1985 to be based largely on lignite and coal



SOURCE: Electric Reliability Council of Texas

should coal supplies be unavailable, and one of the lignite-fired plants is designed to switch to fuel oil as a secondary fuel. The two nuclear generating plants already under construction will begin operating in 1980.

The rise in generating costs has been due to the sharp increase in the price of natural gas. The fuel bill can be reduced through substitution of cheaper fuels, which, however, entails higher fixed-cost investments in plant and equipment. Despite the large investments, the cost of generating electricity will be lower than if new gas-fired plants are built. Moreover, the kinds of substitutions made will depend not only on the alternative fuels available but also on projected load requirements.

Load management

Ranked according to cost, Texas lignite is the least expensive boiler fuel, followed by nuclear energy, western coal, and then natural gas and fuel oil. All the utilities would like to switch entirely to lignite, but because of its limited supply, they have to move to nuclear energy and western coal. However, excess capacity in coal or nuclear-fired plants can quickly dissipate any expected saving. Therefore, plans for new generating plants must be tailored to projected load requirements.

Electricity use changes continuously–from hour to hour, day to day, and month to month. The *peak load* is the biggest demand a utility expects to meet. It is typically of very short duration and is followed by a long interval of slack in overall demand. The minimum continuous demand a utility expects to meet is the *base load*, which usually makes up the first 50 to 55 percent of peak demand. Between base load and peak load is the *secondary load*, which averages 25 to 35 percent of peak demand.

To minimize the average total cost of generating electricity, the utilities maximize the use of generating plants that have the biggest fixed investment but burn the cheapest fuel–to carry the base load. After the base load is met, the utilities bring into operation cycling units–intermediate facilities that have a lower fixed cost but burn more expensive fuels–to carry the secondary load. The generating equipment used to meet the peak load is idle much of the time. Therefore, generating costs are minimized if this equipment has a relatively low fixed cost but can burn an expensive fuel for short intervals.

Plans for new generating plants must be tailored to projected load requirements.

For example, utilities with nuclear, coal, and gas-fired plants would allocate the nuclear generator to the base load, the coal-fired facility to the secondary load, and the gas-fired generator to the peak load. This schedule allows the high-fixed-cost nuclear plant to run continuously with little excess capacity. At the same time, high-cost gas is used sparingly, and the low-cost gas plant is allowed to be idle most of the time. The medium-cost coal-fired plant remains idle some of the time, but this loss is offset by the fact that its fuel is not too expensive.

–Edward L. McClelland

The Payments Mechanism–

A Primer on Electronic Funds Transfer

All modern economies have some sort of system for making payments for goods and services. And as long as this mechanism works well, it tends to be taken for granted, without concern for changing it or increasing its efficiency.

In the United States, commercial banks are the major firms in the payments mechanism, and the paper check is the principal means of making payments. Although the system of paper checks has become increasingly automated, many people in banking and finance are convinced that it is becoming much less important. A system that moves electronically the information now carried on checks could be more efficient than the present system in many areas. Developments in electronic funds transfer have been especially rapid in recent years.

Electronic funds transfer promises to bring many changes in the payments mechanism–and the institutions providing payments services.

Electronic funds transfer promises to bring many changes in the payments mechanism–and the institutions providing payments services. Its development carries implications not only for the way banks operate internally but also for relationships between banks, both large and small. It is also tying nonbank thrift institutions to the payments mechanism more closely and bringing them into direct competition with commercial banks.

The development of electronic funds transfer raises many questions–questions of regulation of the new systems, of ownership of shared facilities, and of how public interest can best be served. These questions will be treated in a future article in the *Business Review*. This article surveys the types of electronic funds transfer arrangements being developed.

Bank wire systems

Initial attempts at automating the payments mechanism centered around expediting the exchange of funds between individual banks. The Federal Reserve wire system and the bank wire system are examples of limited-access electronic funds transfer systems.

The Federal Reserve wire system was established in 1918 to allow the Board of Governors in Washington and the Federal Reserve banks and their branches to transmit and receive information among themselves. Information was first sent by Morse code, but a teletype system was adopted in 1937. Changing needs and advanced technology fostered continual improvements in the Federal Reserve communication system, and by late 1973, the system had become fully automated.

The Board of Governors, the Reserve banks and branches, the U.S. Treasury, and more than 200 member banks are now linked together through the highly sophisticated Federal Reserve communication system. The components of the system are linked by teletype lines to a central switch, located in Culpeper, Virginia, and operated by the Federal Reserve Bank of Richmond. At the Culpeper Switch, four communications computers route messages between Reserve banks.

A major use of the system is for transfers of reserve account balances from one member bank to another. These transfers may be for the accounts of the member banks, such as transactions in the Federal funds market, or for the accounts of their customers. All these money transfers are credit transfers–that is, a member bank instructs the Federal Reserve to transfer funds from its reserve account to another member bank.

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The system also transfers U.S. Government and federal agency securities. These transfers are facilitated by "book entry" securities–which are evidenced by an entry on the books of a Federal Reserve bank. The securities are transferred electronically by adjusting the security accounts of member banks.

In 1950, 14 banks in the major money market centers of Chicago and New York set up a communication system similar to the Federal Reserve wire system, whereby they could send payments messages among themselves. The bank wire has continued to grow in terms of number of members, and hundreds of banks across the nation are now able to accommodate payments messages among themselves through computerized switching centers located in Chicago and New York.

The automated clearinghouse

A cornerstone of the emerging electronic funds transfer system is the automated clearinghouse. Simply stated, its function is to trans-

mit debit and credit items through the financial system electronically rather than by paper. An automated clearinghouse is functionally analogous to a clearinghouse that processes checks–both organizations clear funds transfers between banks. With an automated clearinghouse, funds transfers take the form of electronic impulses on magnetic computer tapes instead of a paper instrument.

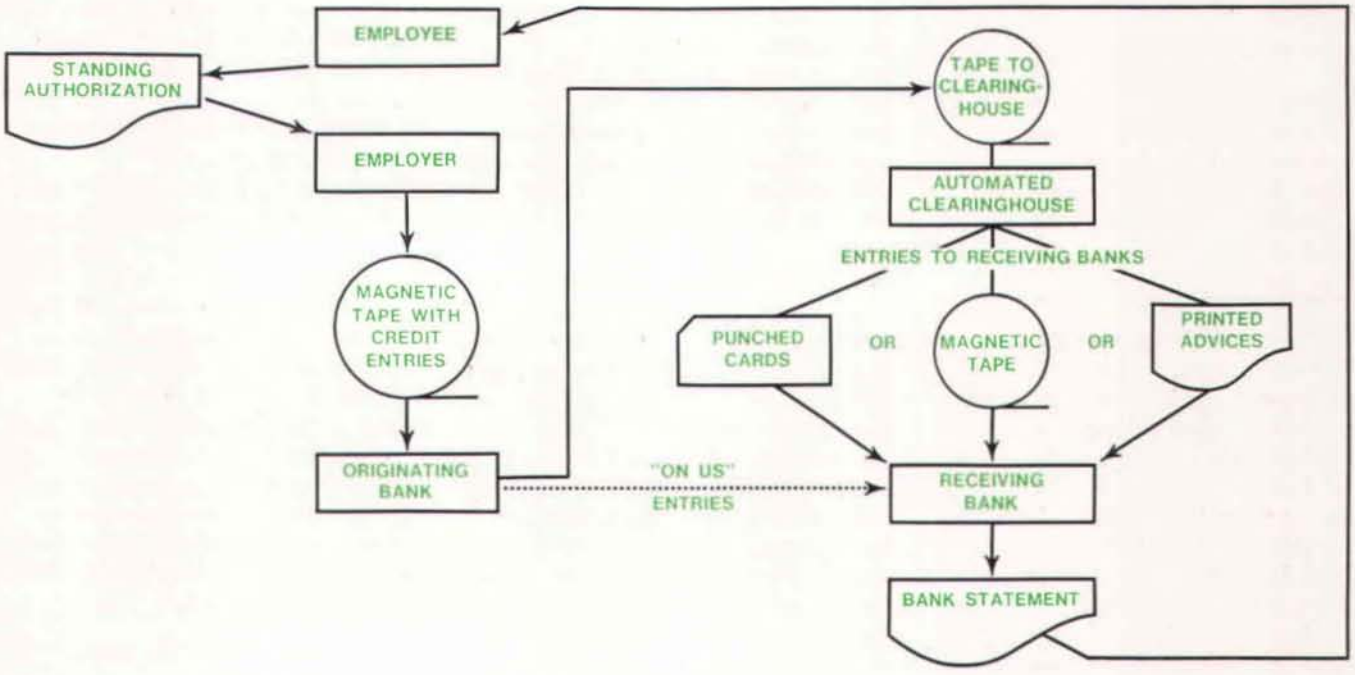
Where payments are made electronically–as in payroll depositing, preauthorized billing, or point-of-sale transactions–settlement between the financial institutions involved can be made through an automated clearinghouse. The economic advantages of an automated clearinghouse lie in the substitution of magnetic tapes for the paper instruments that make the existing payments system cumbersome. Economies are particularly evident in the case of repetitious transfers, such as payroll deposits, mortgage payments, and insurance premiums.

A cornerstone of the emerging electronic funds transfer system is the automated clearinghouse.

Development of the automated clearinghouse began in 1968, when a group of California bankers formed the Special Committee on Paperless Entries to study the feasibility of exchanging payments on magnetic tape. The committee developed the computer software, rules, and legal arrangements for the operation of an automated clearinghouse. Its work formed the basis for establishing automated clearinghouses in California and elsewhere. The Atlanta-based Committee on Paperless Entries extended the work of the California committee, leading to the organization of the Georgia Automated Clearing House Association in 1973.

The National Automated Clearing House Association was formed in 1974 as an independent corporation to develop the interregional exchange of paperless entries and to promote the automated clear-

Plan for Electronic Direct Deposit of Payroll



SOURCES: L. Richard Fischer (*Consumer Credit 1975*, Practising Law Institute)
Federal Reserve Bank of Dallas

inghouse movement. The computer software owned by the national association is available to any member, making the creation of a new automated clearinghouse less costly than it once was. The association now has 21 operational members processing more than 925,000 payments per month. One of these is the Southwestern Automated Clearing House Association, which serves the Eleventh Federal Reserve District. Six more members are expected to begin operation by the end of this year.

As automated clearinghouses were organized, Federal Reserve banks agreed to provide the clearing and settlement facilities for exchanging payments on magnetic tape. Several factors prompted Federal Reserve participation.

The automated clearinghouse is an extension of the Fed's role in the existing check collection system. Having an automated clearinghouse at the Federal Reserve capitalizes on the Fed's experience with check clearing. The Fed is also experienced in nationwide data communications, which is advantageous in linking the regional automated clearinghouses to each other. And the Fed has been willing to invest in the development of the clearinghouses to help increase the efficiency of the payments mechanism.

But just as check clearinghouses may be operated independently of the Federal Reserve, so can automated clearinghouses. Currently, two of them–one in New York and the other in Chicago–have made arrangements to process the electronic tapes outside the Federal Reserve bank.

Direct deposit of payroll

The direct deposit of payrolls has been done on a limited basis for many years, but most plans utilized composite checks. In a composite check program, a company sends banks a listing of amounts to be credited to specific employee accounts, along with one check to cover the total amount. Such plans are restrictive because either the employee is required to bank at the employer's bank or the employer has to deal with each employee's bank separately. While the number of checks passing through the banking system is reduced, composite check arrangements fail to capture the economies of automatic electronic payroll depositing.

Although financial institutions are the initial beneficiaries, a direct deposit system offers benefits to all participants.

With direct deposit of payroll, using an automated clearinghouse, a company obtains authorizations from participating employees to initiate credit entries to their accounts. The company prepares a magnetic tape indicating the routing number of each employee's financial institution, the employee's account number, and the net amount to be deposited in his account.

Several days before payday, the company sends the tape to its bank, which must have access through a member of an automated clearinghouse. This bank extracts from the tape the deposits of employees having accounts with it and the other financial institutions for which it processes. The tape, with the remaining names, is then sent to the automated clearinghouse.

The automated clearinghouse sorts out the names by institution and prepares either a magnetic tape or a printed advice for each receiving institution, listing each employee, account number, and amount to be deposited. The actual crediting of accounts and settlement between institutions occur on payday. Instead of a paycheck, a participating employee receives an accounting record of pay and deductions.

Although financial institutions are the initial beneficiaries, a direct deposit system offers benefits to all participants. It saves employees time and the trouble of depositing paychecks, and the danger of lost or stolen checks is eliminated. Their funds are deposited regularly, even during illness or vacations and trips. For employers, benefits include the elimination of check processing and reconciliation costs, as well as a reduction in check printing costs. Against these benefits, the companies face a loss of interest earnings or check float, since the average period for paycheck deposit and clearing is reduced by direct deposit plans.

The most obvious benefit to the financial institutions accrues from automation in processing payroll deposits. But substantial benefits are also realized from a reduction in peak loads on regular paydays. By reducing the peak loads associated with payroll checks, banks and thrifts can reduce overtime and the use of temporary tellers. A one-for-one reduction of checks probably would not occur because direct deposit of payroll could add more accounts to the banking system. And consumers may need to write more checks to obtain currency. But these effects only partially offset the cost savings. Atlanta Payments Project studies, from Georgia Institute of Technology, indicate a savings of 8 to 10 cents per item.

The Treasury's direct deposit program for Social Security payments was paper-based until this spring, when magnetic tape processing was initiated in Georgia and Florida. The electronic phase of the program is being expanded to the rest of the country in stages so that by the end of 1976, 39

centers will be distributing payments electronically. And acceptance of the direct deposit program by Social Security recipients has been growing steadily. By August 1976, about 15 percent of those eligible–or over 4.6 million–were participating.

Preauthorized bill payments

Preauthorized bill payment plans also have been used for some time. In a paper-based plan, the customer creates a standing authorization with a company and his bank for making payments on a regular basis. Using the authorization, the company enters a debit item into the banking system, and payment is made out of the customer's account through regular check-clearing channels.

The flow of funds and information is changed only slightly with electronic funds transfers. To process preauthorized electronic payments, the company creates a tape, listing a routing number and account number for each participating customer, along with the amount owed and the date it is due. The company sends the tape to its bank, which processes and then distributes output tapes to receiving institutions via an automated clearinghouse in essentially the same way as for payroll tapes under the direct deposit plan.

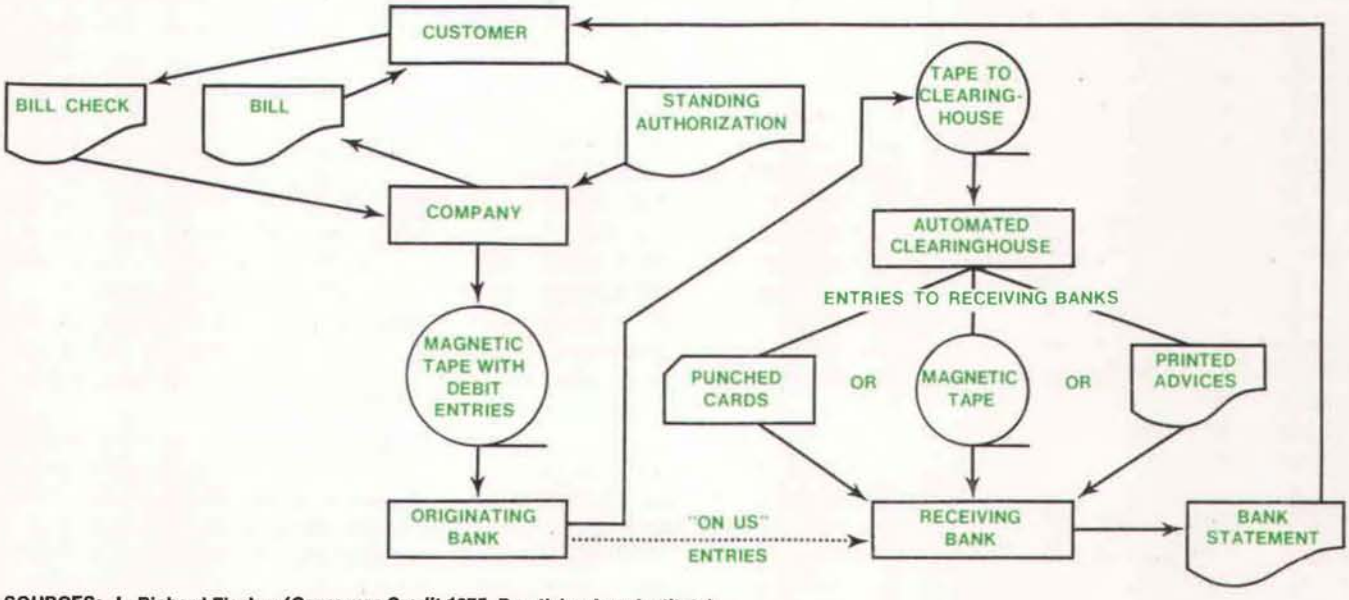
Although a preauthorized debit system offers the customer convenience and savings by eliminating check writing and mailings, only a small percentage of customers have taken advantage of it. The advantages are evidently offset by a perceived loss of control and perhaps a fear of overdrafts.

But for companies and financial institutions, the bill payment plans offer a large potential for reducing costs. Eliminating check handling reduces bill-processing costs directly and also accelerates the availability of funds for companies. And financial institutions can replace paper processing with relatively less expensive electronic processing.

The Bill Check system was developed by the Atlanta Payments Project to overcome some of the customer resistance to preauthorized payments. An agreement authorizing payment is printed on the bill a company sends a customer and may be signed and returned in lieu of other forms of payment. The Bill Check authorization is for a single payment only, and the customer can indicate the exact amount he wishes to pay.

By giving the customer complete control over the amount and timing of the payment, the Bill

Plan for Electronic Preauthorized Bill Payments



SOURCES: **L. Richard Fischer *(Consumer Credit 1975*, Practising Law Institute)**
Federal Reserve Bank of Dallas

Check apparently is more palatable to customers than other preauthorized debit systems. It is especially suitable for payments that vary greatly from month to month and in cases where less than the full amount is to be paid. Also, the format of the Bill Check allows the customer to pay by cash or check.

From the company's point of view, the Bill Check is a simple system to install and does not require major changes in billing systems. The system eliminates most check handling and, along with it, the need to reconcile checks with bill stubs. Once a Bill Check entry is created on the computer tape, processing a company's deposits is cheaper.

Check truncation

By reducing the number of physical handlings per check, check truncation lowers the expense of clearing checks. Checks are written as usual. But at some point after a check enters the banking system, the data on it are captured electronically. The check itself is retained at the point of interception, while the data are transmitted through the financial system via electronic means. Canceled checks are replaced by entries on a customer's descriptive bank statement. However, provision must be made for retrieving checks requested by the customer.

Although checks can be intercepted at almost any point of processing, most truncation schemes involve interception at the bank at which the check is first deposited and processed or, alternatively, the bank at which the check is last processed. The earlier the check is captured, the greater is the displacement of present check-clearing costs. But at the same time, early interception necessitates higher transmission costs and the participation of a greater number of banks.

The Atlanta Payments Project study suggests that the most viable form of check truncation is a local point-of-entry scheme. Such a scheme is limited to banks in a single geographic area. Any check drawn on a bank in the area–and participating in the system–is truncated at the first participating bank to receive the check. Because the scope of the system is limited, retrieval and security problems and transmission costs are less than under a full bank-of-first-deposit system.

The success of check truncation systems will depend largely on acceptance by bank customers. Depositors appear unwilling to give up their canceled checks for just a listing of check numbers and coded numbers corresponding to payees but appear willing to accept fully descriptive statements. Thus, an acceptable type of truncation requires converting the image of a check or a portion of it to a form that can be transmitted and stored electronically and then reproduced in facsimile on the regular bank statement.

Widespread implementation of check truncation seems unlikely anytime soon. Although the system would reduce the costs of processing checks and, thus, benefit both banks and their customers, the advantages evidently appear relatively minor to most customers. But a transactor such as the U.S. Government could significantly benefit from a check truncation system. In fact, a check truncation system is now being tested in a joint program between the Treasury and the Federal Reserve Bank of Dallas. The system is designed both to speed the delivery of check data to the Treasury and to make check reconciliation more efficient.

For this project, the Treasury magnetically encodes certain bookkeeping information on test checks. This information, plus the amount of each check, is electronically recorded on magnetic tape when a test check reaches the Federal Reserve bank. In addition, each check is recorded on microfilm. The magnetic tape and microfilm are sent to the Treasury in place of the checks themselves. The reconciliation of accounts by the Treasury is speeded up since the records stored on magnetic tape are processed by computer. Furthermore, the delivery of check data from the Fed to the Treasury is speeded up so that the Treasury can respond more quickly to inquiries about lost checks or nonpayment of checks.

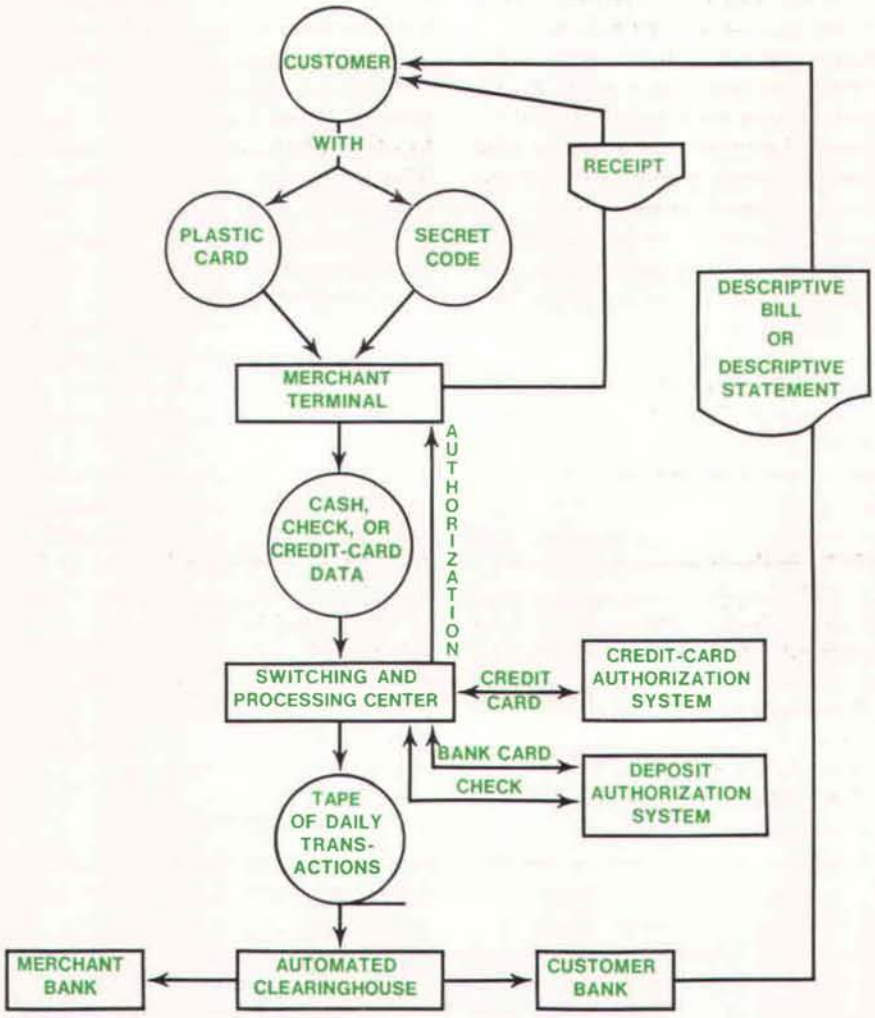
The pilot project at the Federal Reserve Bank of Dallas is scheduled to run through September 1976. A separate project to be initiated at the Federal Reserve Bank of Richmond in February 1977 will test the procedure on different equipment. If these projects prove the feasibility of truncation procedures, full-scale implementation will begin in late 1977.

Automated teller machines

In the early 1970's, a sizable number of commercial banks and thrift institutions began offering customers more convenient service through the use of automated teller machines. The automated teller machine can be remotely located or connected to the premises. Placement of these terminals off the premises has resulted in debate as to whether they should be considered branches. The issue is currently being considered by the courts.

Most institutions that have off-premises automated teller machines have continued to operate their machines, pending the decision of the courts, and several thrift institutions and banks that are not limited by state branching laws now have several hundred in operation. By early 1976, about 1,300 U.S. financial institutions

Plan for Electronic Point-of-Sale System



SOURCES: L. Richard Fischer (*Consumer Credit 1975*, Practising Law Institute) Federal Reserve Bank of Dallas

had installed a total of over 4,000 cash automated teller machines.

The automated teller machine usually offers the customer most of the services available at the standard teller window in a banking or other thrift institution. Although the capabilities of systems vary from one institution to another, a customer generally may use the automated teller machine to make cash deposits to or cash withdrawals from his account, make credit-card cash withdrawals, or make payments on account. In systems operated by some commercial banks, the customer also may transfer funds between his checking and savings accounts. Obtaining account balances is another important feature in many systems.

In the early 1970's, a sizable number of commercial banks and thrift institutions began offering customers more convenient service through the use of automated teller machines.

Use of the automated teller machines increases the time available to the customer for routine financial transactions. A free-standing terminal can operate on a 24-hour, seven-day basis. While this feature benefits customers that find it inconvenient to make transactions during normal business hours, other advantages are evident as well. Travel to and from the depository institution is replaced by a shorter trip to the nearest remote terminal, and customer waiting lines, even on high-volume days, are much shorter.

The customer activates an automated teller machine by inserting a plastic card. Systems may use standard credit cards, magnetically encoded with additional data, or special cards. The

special cards are generally referred to as bank cards, asset cards, or debit cards.

A major concern with automated teller machines is unauthorized access to customer accounts. In most systems, this problem is handled by requiring the customer to enter a personal identification number after activating the machine with the plastic card. If the correct personal identification number is not entered in the machine, no transaction can be completed. In addition, the machine may retain the card on the assumption that lack of the correct number means unauthorized use of the card.

Automated teller machine systems have met with varying success. One of the more successful systems was instituted by the First National Bank of Atlanta. After considerable research, the bank installed its first automated teller machines in April 1974 and embarked on an extensive marketing program. The bank has indicated that transactions completed on its automated teller machines cost about 40 percent less than those completed by an ordinary teller.

Point-of-sale systems

Of all the alternative electronic funds transfer systems, point-of-sale systems offer the most significant and potentially the most beneficial change. By entering transaction data into the electronic payments network at the time and place of sale, the systems accommodate the paperless transfer of funds in ordinary transactions between customers and businesses.

A point-of-sale system allows the customer to pay for goods and services at the merchant location by having funds transferred from his checking or credit-card account to the merchant's account–either immediately or at the end of the month. It also enables the merchant to verify the availability of funds in a customer's account before accepting his check or initiating a funds transfer.

From the customer's point of view, the key to the point-of-sale system is a magnetically encoded plastic card issued by his depository institution. As with the automated teller machine, unauthorized access to his account may be guarded against by the required use of a personal identification number known only to the customer. To enable him to check the accuracy of a transaction and maintain his records, the customer receives a printed receipt.

Of all the alternative electronic funds transfer systems, point-of-sale systems offer the most significant and potentially the most beneficial change.

The complexity of a point-of-sale system depends on the number of services offered and whether funds will be transferred between two or more financial institutions. The merchant may select a system that offers any or all of the principal services available–check verification and authorization, complete processing of payments by direct funds transfer, and complete processing of payments by bank credit card.

Point-of-sale processing is much simplified if both the merchant and customer have accounts at the same institution, and most of the point-of-sale experiments have been of this type. For the complete processing of funds transfers between numerous depository institutions, a point-of-sale system requires a switching and processing center. The center is electronically linked to the merchant terminals and the computer systems of participating depository institutions. It receives and verifies data transmitted from the point of sale, routes data to the customer's bank for authorization, receives confirmation of the transaction's validity from his bank, and transmits the confirmation back to the point of sale.

Although technology for immediate transfer of funds is available, the cost of a system that transfers funds as each transaction occurs is considerably higher than for a system using a batch-processing method. With the batch method, at the end of each day, the switching and processing center forwards data posted during the day to an automated clearinghouse. The automated clearinghouse sorts and transmits the data to the appropriate depository institutions.

Point-of-sale terminals are being installed by the thousands in various areas of the country. In many places, nonbank thrift institutions have led commercial banks in installing complete systems. This can be attributed, at least in part, to the less restrictive legal and regulatory environment in which the thrift institutions are operating. The Federal Home Loan Bank Board adopted temporary regulations in January 1974 that permit federal savings and loan associations to experiment with the use of the terminals. These regulations have recently been extended through 1977.

An example is the operation developed by the First Federal Savings and Loan Association in Lincoln, Nebraska. In 1974, First Federal set up point-of-sale terminals at convenience counters in several Hinky Dinky supermarkets. The terminal allows the customer to make cash deposits to or cash withdrawals from his account at First Federal.

To make a cash deposit of, say, $100 to his savings account, a customer presents his magneti-

cally encoded card at the terminal, which is linked directly to the computer at First Federal. The computer transfers $100 from the supermarket's account at First Federal to the customer's account at First Federal, and the supermarket takes $100 from the customer.

In the case of a cash withdrawal, the procedure is reversed. The customer's account is debited, the supermarket's account is credited, and the customer receives $100 from the store. But if the customer then purchases $100 of merchandise, the supermarket has the same amount of cash as before. In effect, payment has been made by the transfer of funds between accounts at First Federal.

Other thrifts have begun to install similar systems. A California savings and loan association is operating a system with one slight refinement. Several terminals are installed, on-line to the institution's computer center, at checkout counters in stores. These terminals can be used for direct debiting and crediting of accounts for purchases of merchandise, thereby eliminating currency from the transactions. The terminals can also be used to make cash deposits and withdrawals.

The regulatory environment for the commercial banks with point-of-sale terminals is much less certain. Currently, the crucial matter to be resolved is whether point-of-sale terminals constitute bank branches if deposits and withdrawals are made.

A number of banks have been actively installing and expanding point-of-sale terminals, most of which are limited to check verification. Citibank, for instance, has several thousand check verification terminals in place around New York City. The bank is franchising the plastic card that accesses the terminals to banks in other trading areas. Wells Fargo Bank in California has installed several hundred terminals to be used for both check verification and credit-card authorization.

The expansion of the point-of-sale systems of commercial banks depends on rulings of the courts and state legislatures as to their status as bank branches. Thus, implementation of a point-of-sale system in a five-state midwestern area was postponed recently when the Missouri legislature failed to pass enabling legislation to allow Missouri banks to participate.

Currently, attention is focused on a court case involving point-of-sale terminals and automated teller machines operated by Continental Illinois National Bank and Trust Company of Chicago and First National Bank of Chicago. The U.S. circuit court of appeals upheld the ruling of a lower court that the terminals operated by the banks constitute illegal branching under state and federal statutes. The banks have petitioned the Supreme Court to overturn the ruling.

–Mary G. Grandstaff
Charles J. Smaistrla

New member banks

Bank of Las Cruces, National Association, Las Cruces, New Mexico, a newly organized institution located in the territory served by the El Paso Branch of the Federal Reserve Bank of Dallas, opened for business August 9, 1976, as a member of the Federal Reserve System. The new member bank opened with capital of $500,000, surplus of $250,000, and undivided profits of $250,000. The officers are: Wm. Byron Darden, Chairman of the Board; R. D. Heckler, President; and Gary N. Andersen, Cashier.

Chemical National Bank, Clute, Texas, a newly organized institution located in the territory served by the Houston Branch of the Federal Reserve Bank of Dallas, opened for business August 16, 1976, as a member of the Federal Reserve System. The new member bank opened with capital of $200,000, surplus of $200,000, and undivided profits of $200,000. The officers are: V. A. Thorpe, Chairman of the Board; Ralph E. David, President; Brian W. Garrison, Executive Vice President; and Shirley F. Burwell, Vice President and Cashier.

New par banks

Citizens Bank, Bryan, Texas, a newly organized insured nonmember bank located in the territory served by the Houston Branch of the Federal Reserve Bank of Dallas, opened for business August 5, 1976, remitting at par. The officers are: Dr. Mackin L. Jones, Chairman of the Board; Stanley Sommers, President; and Robert L. Ayres, Vice President and Cashier.

Gibsland Bank & Trust Company, Gibsland, Louisiana, an insured nonmember bank located in the territory served by the Head Office of the Federal Reserve Bank of Dallas, began remitting at par August 9, 1976. The officers are: Enoch T. Nix, Chairman of the Board; J. R. Johnson, President; D. E. Cole, Vice President; H. R. Newman, Jr., Assistant Vice President; and Mrs. Fred F. Sutton, Jr., Cashier.

Empire Bank, Dallas, Texas, a newly organized insured nonmember bank located in the territory served by the Head Office of the Federal Reserve Bank of Dallas, opened for business August 18, 1976, remitting at par. The officers are: Bert A. Nelson, Chairman of the Board; Robert E. Edgmon, President; Larry Crenshaw, Vice President and Cashier; and Gary Hutchison, M.D., Vice President (Inactive).

Federal Reserve Bank of Dallas
September 1976

Eleventh District Business Highlights

RETIREMENT PLANS ATTRACT MORE INTEREST

Individual Retirement and Keogh Accounts are becoming a popular method for qualified individuals to increase their income when their working years are ended. Banks in this District and across the nation are actively vying with other financial intitutions for these funds.

The Keogh Act of 1961 permits self-employed business and professional people to defer payment of Federal income tax on a limited portion of their income by setting up a special individual retirement account. The flow of funds to these accounts, however, has been minimal, as the number of people covered by the Act has been relatively small and many have invested their funds in ways thought to be more rewarding.

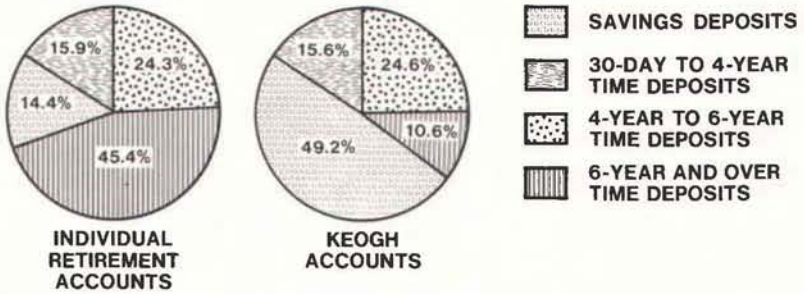
In 1974, a new pension law was enacted to extend a similar tax advantage to all individuals who are full-time employees but are not covered by an employer's formal retirement plan. Under the 1974 Act, these individuals are able to defer payment of Federal income tax on 15 percent of their annual wages and salaries—up to a limit of $1,500 a year—if the funds are placed in a qualified Individual Retirement Account. The same Act also raised the amount of the annual tax deduction on Keogh Account contributions from 10 percent of income to 15 percent—up to a limit of $7,500 a year. In addition to the tax deduction for contributions to these accounts, taxes on interest income on both types of accounts also are deferred.

At the end of March 1976, 60 percent of the commercial banks in the Eleventh District held deposits in these retirement-type accounts. In fact, Individual Retirement and Keogh Accounts totaled $33.1 million, with an average size of $1,478 for Individual Retirement Accounts and an average size of $2,233 for Keogh Accounts. These deposits represent a minimal proportion of total deposits at these banks. However, as the size of the average account increases with time and as an increasing number of people participate in these plans, it is possible that deposits in these retirement accounts may become an important source of bank funds.

The 1974 Act apparently is being received with more enthusiasm than the earlier Keogh Act covering only self-employed people. By the end of last March, the number of Keogh and Individual Retirement Accounts at commercial banks in the District totaled 21,482. Almost 92 percent of these accounts were Individual Retirement Accounts. The number of employees not covered by formal employer pension plans is much greater than the self-employed population. And, the average wage earner is usually financially less able to seek out alternative investments to provide for his retirement.

Commercial banks are permitted to pay up to 7¼ percent interest on individual retirement funds deposits if the funds are placed in time deposits with a maturity of four years. However, such banks may pay up to 7½ percent for funds placed in time deposits of at least six years maturity, and the largest portion of Individual Retirement Account deposits at commercial banks are being placed in the longer maturities to acquire the best interest return. Keogh Account deposits, however, are more concentrated in shorter-term savings accounts.

PERCENT DISTRIBUTION OF INDIVIDUAL RETIREMENT FUND DEPOSITS AT ELEVENTH DISTRICT COMMERCIAL BANKS, MARCH 31, 1976



SOURCE: Board of Governors, Federal Reserve System

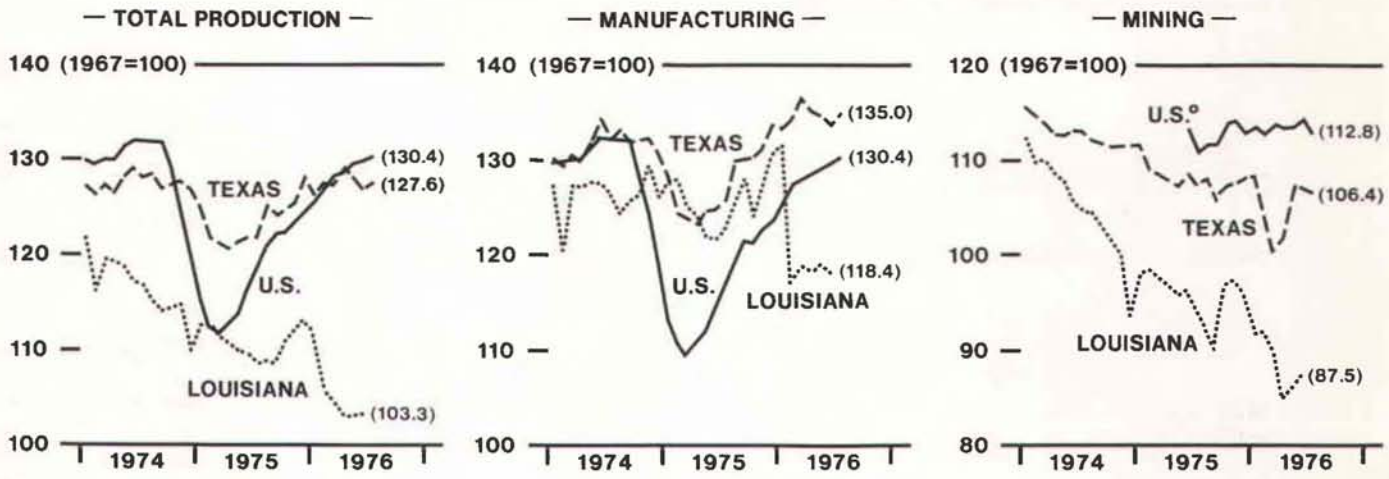
DRILLING RECOVERY UNDERWAY

A number of local oil booms—oil men call them "plays"—are adding to the recovery in rig activity from the decline it suffered in the first half of this year. In Texas, interest in the Austin Chalk formation has spurred drilling from East Texas to

(Continued on back page)

INDUSTRIAL PRODUCTION

(SEASONALLY ADJUSTED)

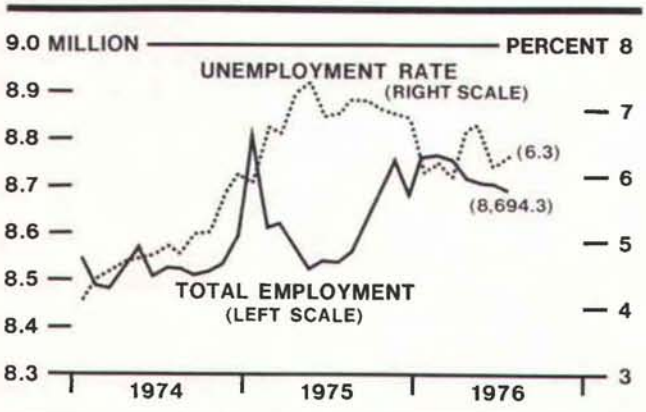


SOURCES: Board of Governors, Federal Reserve System
Federal Reserve Bank of Dallas

°Comparable back data from the 1976 revision are not yet available.

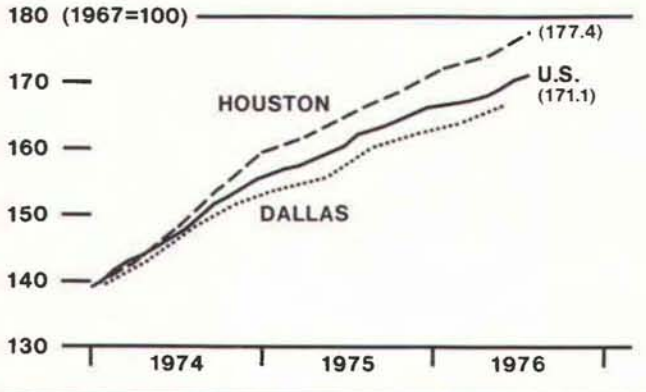
EMPLOYMENT AND UNEMPLOYMENT

FIVE SOUTHWESTERN STATES[1]
(SEASONALLY ADJUSTED, BY FRB)



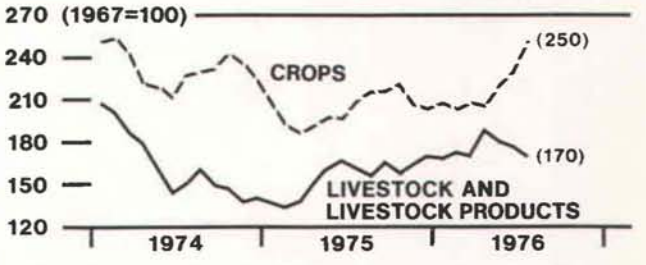
1. Arizona, Louisiana, New Mexico, Oklahoma, and Texas
SOURCE: State employment agencies

CONSUMER PRICES



SOURCE: U.S. Bureau of Labor Statistics

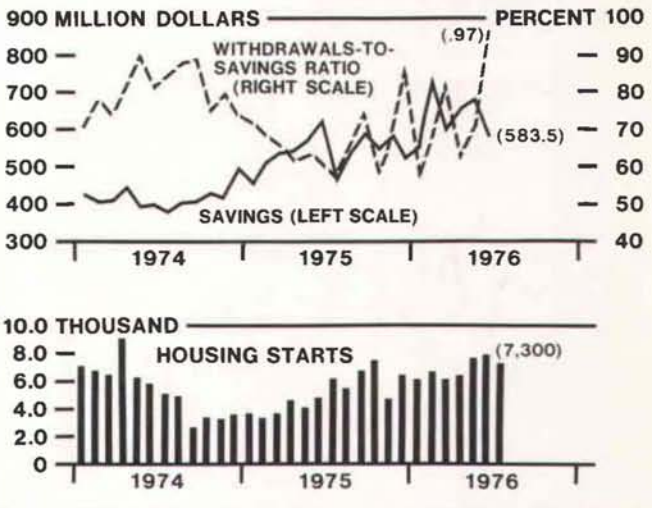
PRICES RECEIVED BY TEXAS FARMERS



SOURCE: U.S. Department of Agriculture

SAVINGS AND LOAN ASSOCIATION ACTIVITY AND HOME BUILDING IN TEXAS

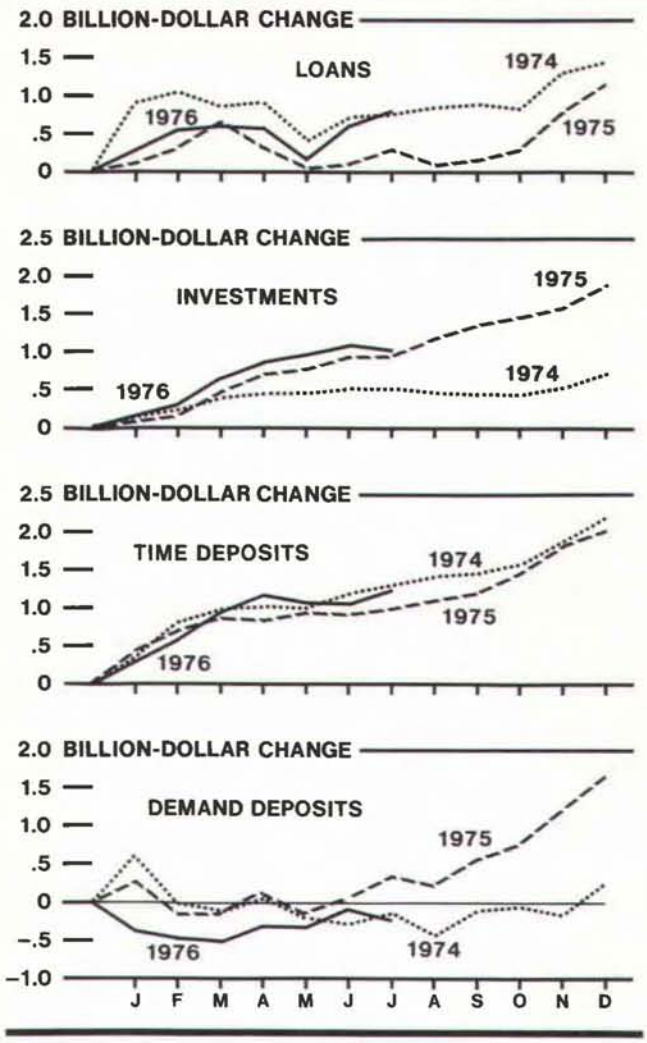
(SEASONALLY ADJUSTED, BY FRB)



SOURCES: Bureau of Business Research, University of Texas
Federal Home Loan Bank of Little Rock

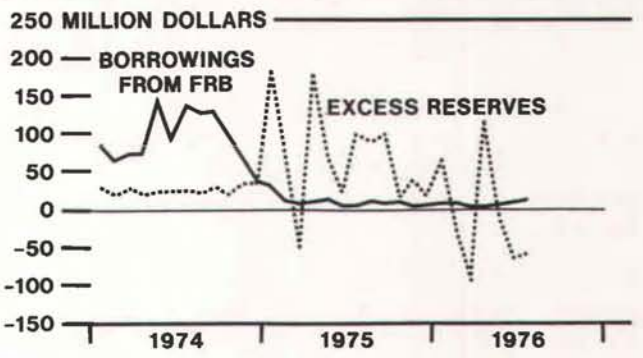
CONDITION STATISTICS OF ALL MEMBER BANKS

ELEVENTH FEDERAL RESERVE DISTRICT
(CUMULATIVE CHANGES)



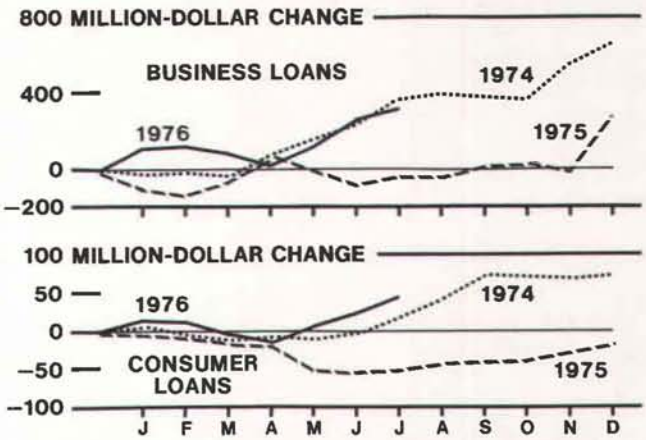
RESERVE POSITION OF MEMBER BANKS

ELEVENTH FEDERAL RESERVE DISTRICT
(MONTHLY AVERAGES OF WEEKLY DATA)



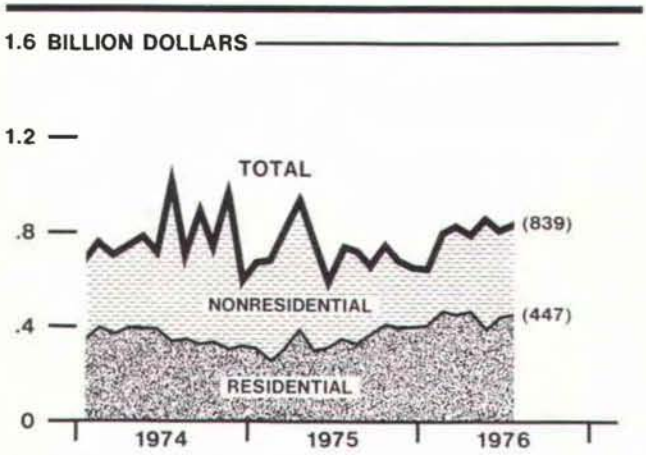
LOANS AT WEEKLY REPORTING BANKS

ELEVENTH FEDERAL RESERVE DISTRICT
(CUMULATIVE CHANGES)



BUILDING CONTRACTS

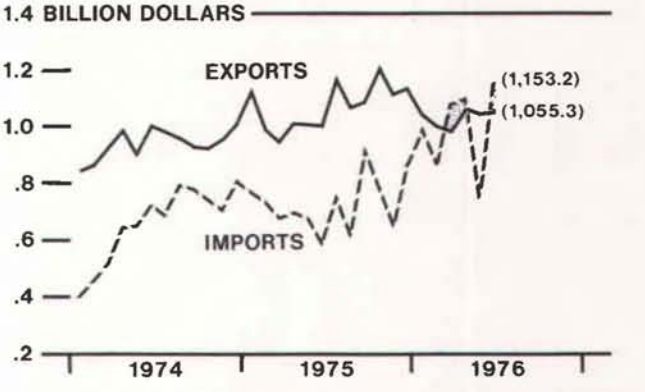
FIVE SOUTHWESTERN STATES[1]
(SEASONALLY ADJUSTED, BY FRB)



1. Arizona, Louisiana, New Mexico, Oklahoma, and Texas
SOURCE: F. W. Dodge, McGraw-Hill, Inc.

FOREIGN TRADE

HOUSTON CUSTOMS REGION
(SEASONALLY ADJUSTED, BY FRB)



SOURCE: U.S. Department of Commerce

the Rio Grande River, with most of the activity concentrated in South Texas. Estimates are that drillers—mainly independents—have leased a million acres in the last few months. Louisiana and Eastern New Mexico are also enjoying some increased activity and, in Oklahoma, a play in the Binger Area has oil men excited. In addition, there has been continued strong exploration for gas in South Texas and also in the Anadarko Basin in Oklahoma.

Higher prices for interstate gas will further the pickup in rig activity. Louisiana, which is a principal source of natural gas in the United States, should benefit greatly and the higher prices should lead to increased exploration off the Louisiana coast. Furthermore, increased prices will also benefit those states whose weak intrastate markets have proved a poor alternative to outside markets.

The decline in rig activity in the first half of the year hit some states harder than others. From peak activity at the beginning of the year to its lowest level, the rig count declined by more than half in New Mexico, by about a quarter in Oklahoma, and by about 15 percent in Texas and Louisiana. But states that suffered the greatest decline are expected to see the greatest buildup in activity over the rest of the year.

Some areas will, however, still continue depressed. Some exploration areas shared by Texas and New Mexico are very deep and, hence, too expensive to explore even given the higher prices of gas.

In spite of the slowing in rotary rig activity during the first half of this year, the Texas Railroad Commission reports Texas oil and gas well completions up nearly 18 percent over the same period last year, with discoveries of oil up nearly 30 percent and gas up over 20 percent. The difference between the higher number of well completions and the decline in rig activity is at least partly explained by increased drilling in softer, shallower formations. Such discoveries, as characterize the Austin Chalk formation are easily made but are usually relatively small finds. These wells have only recently become profitable with higher oil and gas prices and new technology to fracture the relatively imporous rocks.

OTHER HIGHLIGHTS:

- Preliminary data show the Texas industrial production index rose at an 8.3-percent seasonally adjusted annual rate in July. The rise reflected a significant increase in the manufacture of durable goods. Although production of primary metals, electrical and nonelectrical machinery, and other durable goods was up appreciably, production of furniture and fixtures and transportation equipment was down. The manufacture of nondurable goods was up overall, with the largest advances in petroleum refining, apparel, and printing and publishing. Declines in nondurable goods production were centered in textiles, paper, and chemicals.

  Mining output was down, with weaknesses in the production of metal and stone and crude petroleum. Utility production has remained virtually unchanged during the May-July period.
- The unemployment rate for the five southwestern states increased to 6.3 percent in July from 6.1 percent a month earlier. A small rise in the civilian labor force and a small decline in total employment accounted for the increase in the jobless rate.

  Employment declined in construction and government. The strongest employment gains appeared in nondurable goods manufacturing and mining.
- Total loans at large commercial banks in the District rose moderately in July. Loans to businesses and to consumers increased for the third consecutive month, while agricultural loans advanced for the fourth straight month. An increase in time and savings deposits was not sufficient to offset a moderate net outflow of demand deposits. Consequently, to accommodate the pickup in loan demand, these banks liquidated a portion of their U.S. Government security holdings in July. This reduction represented only the second monthly decline in holdings of these securities since October 1974.
- Total construction activity in the five southwestern states weakened in July. A decline in nonbuilding construction offset modest gains in nonresidential and residential building. During July, construction employment in the southwestern states continued its drop. Housing starts in Texas fell during July, breaking a trend of three consecutive months of advance.
- The ratio of withdrawals to savings inflows at Texas savings and loan associations increased again in June, reaching its highest level since February 1970. Withdrawals rose 14.7 percent and savings fell 15.7 percent from May levels.