



SECOND QUARTER 2012

# Southwest Economy

FEDERAL RESERVE BANK OF DALLAS

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**Oil Boom in Eagle Ford Shale Brings  
New Wealth to South Texas**

# President's Perspective



*Texas companies are leading global providers of oil and gas drilling technology, mining services and expertise.*

When people think of Texas icons, cowboys, “big hair” and oil rigs often come to mind. Cowboys remain an important part of our cultural heritage and big hair may retain its allure for some; meanwhile, our state’s legacy in the energy sector has endured. New drilling technologies have yielded surging oil and gas production. Indeed, Texas again plays an outsized role in the energy industry, producing 2.1 million barrels of oil per day—the same amount as Norway—and 6.7 trillion cubic feet of natural gas a year, only slightly less than Canada.

The oil and gas sector has been synonymous with boom and bust in the past. Fortunately, Texas is unlikely to experience 1980s style energy-led recessions in the future. While oil and gas production are surging, the sector’s importance relative to the overall economy has diminished over the past several decades as a result of diversification. The share of total state

gross domestic product attributable to oil and gas has decreased more than 20 percent since 1982, while the sector’s share of overall employment has dropped from 5 percent to 2 percent.

There’s no denying, however, that with 25 percent of U.S. refinery capacity and about 60 percent of the nation’s petrochemical production, the state benefits from high energy prices. Moreover, Texas companies are leading global providers of oil and gas drilling technology, mining services and expertise. George P. Mitchell, who commercialized new technology allowing hydraulic fracturing of shale, is a Texan.

Discovery of giant oil and gas shale plays in Texas and throughout the United States is an economic and geopolitical game changer. In South Texas, exploration of the Eagle Ford Shale is fueling an economic boom. As Robert W. Gilmer, Raúl Hernandez and Keith Phillips explain in this issue of *Southwest Economy*, the spillover effects in terms of jobs and wealth creation are far reaching.

Growing demand for energy and the development of new technologies will ensure that Texas continues to occupy a special place in the energy sector for many years to come, further strengthening our region’s economic base.

A handwritten signature in gold ink that reads "Richard W. Fisher". The signature is fluid and cursive, with a large initial "R" and "F".

Richard W. Fisher  
President and CEO  
Federal Reserve Bank of Dallas



# Oil Boom in Eagle Ford Shale Brings New Wealth to South Texas

By Robert W. Gilmer, Raúl Hernandez and Keith R. Phillips

*The oil boom's impact on jobs, income and spending in the region has been profound.*

Oil and natural gas activity is booming again in South Texas. The 2008 discovery of the Eagle Ford Shale play has breathed new life into industry in the region, where many mature and declining fields have operated for more than 40 years. Perhaps the largest discovery of new oil reserves in the United States since Prudhoe Bay, Alaska, in 1968, the Eagle Ford Shale extends over 23 South Texas counties (see map).<sup>1</sup>

Its southern edge begins near Laredo and trends northeast toward Austin, producing large quantities of natural gas. The northern edge—the formation is about 50 miles wide—follows a similar trend but produces oil. A central zone is rich in condensates, also called natural gas liquids, valuable to the refining and petrochemical industry on the Texas Gulf Coast.

The race to exploit these new South Texas reserves began in late 2008 and is primarily

the result of recent advances that unlocked the secret of extracting natural gas and oil from shale. This new technology—along with favorable prices, existing infrastructure and ready access to the Gulf Coast refining and petrochemical complex—created the Eagle Ford Shale boom. Rapid oilfield development has brought new jobs, rising income and growing wealth to this historically low-wage, low-income area.

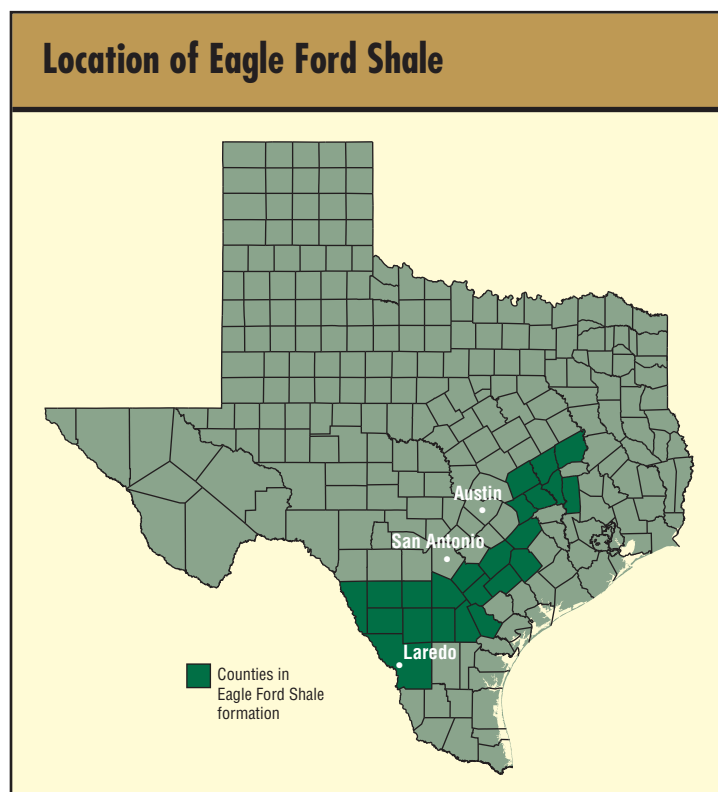
The Eagle Ford's scale and speed of development proved so robust that they quickly overwhelmed previous efforts to comprehensively measure the economic impact.<sup>2</sup> Recent data suggest that the oil boom's impact on jobs, income and spending in the region has been profound.<sup>3</sup>

## Big Trends Speed Development

Behind the Eagle Ford's emergence lies the convergence of important trends—new technology, a new era of plentiful and inexpensive natural gas and a global economic expansion that pushed the price of oil past \$100 per barrel. Eagle Ford's development, beginning in late 2008, was interrupted by the recession and a sharp decline in energy prices. It was back on track by 2010, growing at a rapid pace.

The number of drilling permits issued annually in Eagle Ford counties for new oil and natural gas wells since 2007 (when 1,254 permits were issued) is shown in Chart 1. By 2011, the number of permits issued had more than doubled, with oil-directed permits accounting for 52 percent of the total, up from 20 percent four years earlier. Since 2007, Eagle Ford counties have increased production of natural gas by 24 percent, oil by 80 percent and condensate by 541 percent.<sup>4</sup>

Eagle Ford offers a choice of well-defined zones producing dry gas, oil and natural gas liquids.<sup>5</sup> Initial large-scale commercial production was of natural gas, following the pattern set in the 1990s in the Barnett Shale near Fort Worth. The first commercial application of horizontal drilling and hydraulic fracturing to shale occurred in the Barnett, where

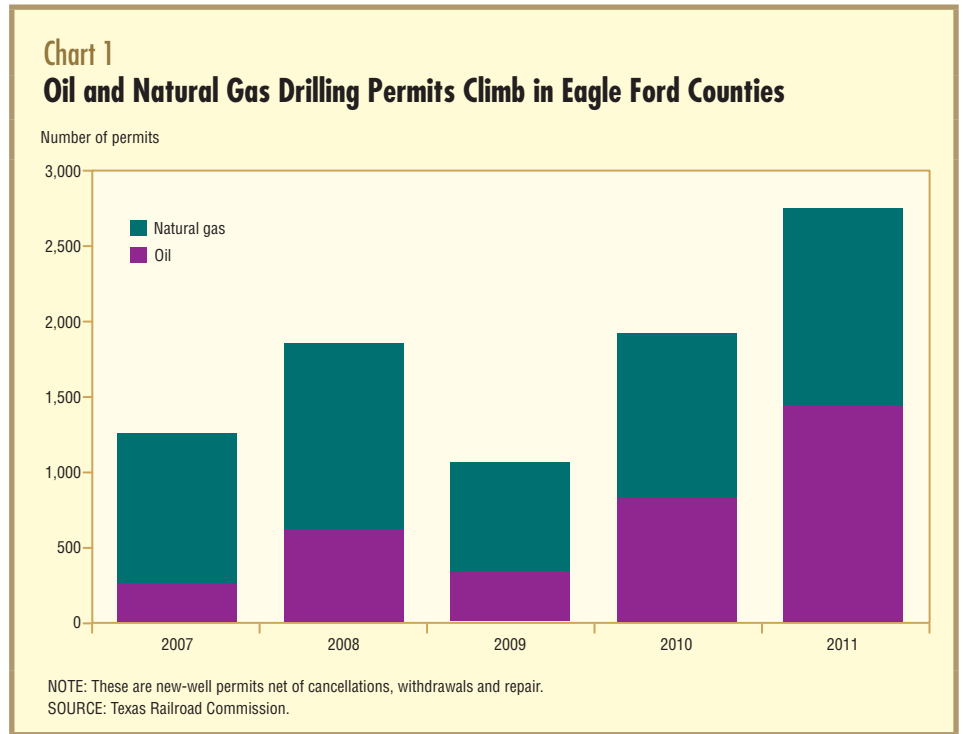


annual natural gas production grew from experimental levels in 2000 to nearly 2 trillion cubic feet by 2011. Commercial production quickly spread to other rich shale plays—the Haynesville on the Texas–Louisiana border and the Marcellus in New York, Pennsylvania and West Virginia. The first Eagle Ford well, drilled in La Salle County in 2008, flowed 7.6 million cubic feet of natural gas per day, among the highest initial flow rates in the region and equivalent to about 1,300 barrels of oil.

In little more than a decade, shale gas development has provided a new and optimistic picture of future U.S. natural gas supplies. The amount of natural gas sent to market peaked previously in 1973; recent shale gas production led sales to new record levels by 2011. Reserves of natural gas are also approaching a new record. If natural gas prices average about \$6 per thousand cubic feet, production is likely to be sustained for many years. While \$6 per thousand cubic feet is a relatively low price, representing the energy equivalent of \$35 per barrel of oil, it is still significantly higher than recent gas prices.

When domestic drilling collapsed in 2008–09 with the economic crisis, the rig count fell more than 50 percent. Drilling has since returned to precrisis levels, but the mix of rigs has changed. One important factor reshaping the environment was a powerful incentive to shift drilling from natural gas to oil or condensate. Condensate is a mix of hydrocarbons that turn into liquids from natural gas as the gas exits the well and pressure falls. Some of these liquids follow the price of natural gas (such as ethane), and others the price of oil (such as propane). From 2007 to 2011, condensate averaged \$48.30 per barrel, oil \$81.56 per barrel and natural gas the equivalent of \$30.53 per barrel. In first quarter 2012, condensate was \$55.17, oil \$102.88 and natural gas \$3.95 per thousand cubic feet, or the equivalent of \$22.91 per barrel.<sup>6</sup>

While the price of natural gas declined steadily after 2008, oil markets took a different path. Rising oil prices are attributed to a variety of causes, including low interest rates and a weaker dollar, but the primary factor is the growth of emerging markets such as Brazil, China and India. As these developing nations quickly snapped back from global recession, oil demand increased and prices returned to high levels, while natural gas—a domestic product—languished at low levels. Eagle Ford Shale producers quickly and easily moved from natural gas to more valuable oil or condensate. From late February 2010 to late



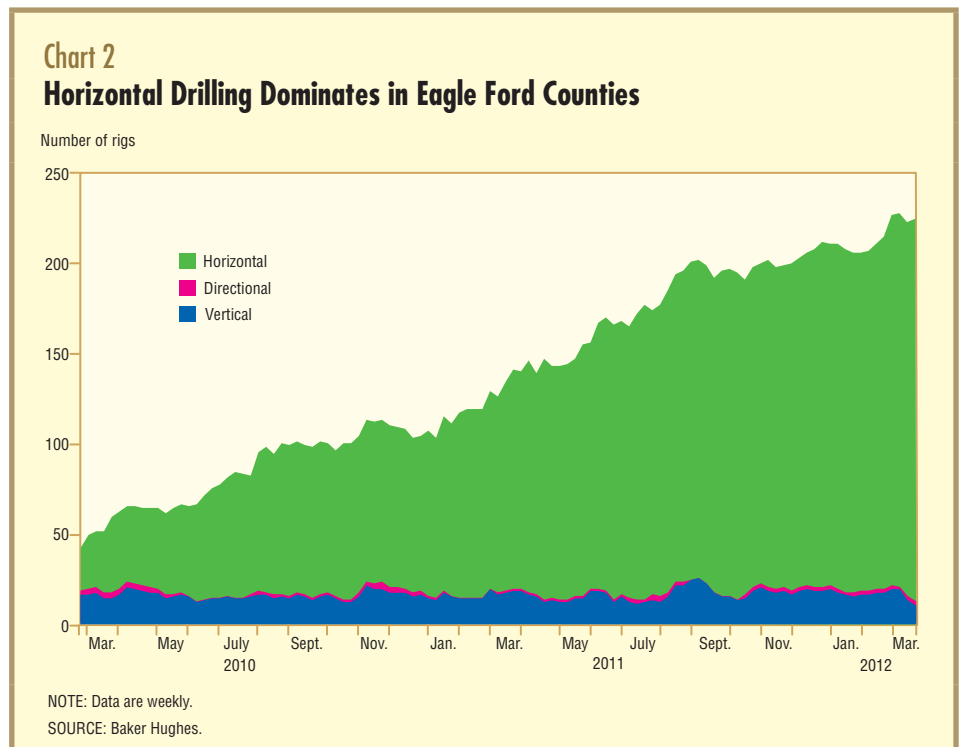
February 2012—as the Eagle Ford rig count grew to 225 from 42—the number of rigs targeting oil or natural gas liquids increased to 175 from six.

The application of horizontal drilling and hydraulic fracturing for production of oil and natural gas liquids (such as ethane, butane and propane) also altered the character of the rig count. Oil's high price helped spur this transfer of technology from shale gas to

liquids from shale. Of the 225 rigs working in Eagle Ford counties in late March 2012, 213 were drilling horizontally (*Chart 2*).

### Effects of Oilfield Development

Oilfield development affects the Eagle Ford region's economy through several channels: lease payments, drilling, pipeline and other infrastructure construction, royalties and the purchase of local goods and services.



Lease payments are made to reserve the mineral rights on a specific property, usually stated as a fixed amount per acre, giving the leasing company the right to test, explore or produce hydrocarbons. A University of Texas at San Antonio (UTSA) study completed in late 2010 assumed 4.6 million acres were leased in Eagle Ford counties at \$1,200 per acre.<sup>7</sup> It seems likely that the lease rate has since increased because of the region's continuing success. There are reports of lease rates as high as \$20,000 per acre in the hottest-producing areas, but the average of 23 counties is difficult to estimate. Lease rates vary not just by location, but also by when they were signed.<sup>8</sup> Conservatively estimating \$1,500 per acre and 5 million acres produces a remarkable \$7.5 billion in compensation since 2007.

Most studies assume that the bulk of these one-time payments—perhaps as much as 95 percent—is converted to savings and wealth. If only 5 percent is spent, however, it constitutes a \$375 million injection into the regional economy.<sup>9</sup>

### Drilling Expenditures Rise

To estimate drilling expenditures, we assume that 90 percent of new drilling permits approved by the Texas Railroad Commission in the 23 counties result in active exploration.<sup>10</sup> Expenditure per well is estimated at \$6.5 million for horizontal drilling, \$2.5 million for directional drilling and \$1.5 million for vertical drilling. These expenditures rise from \$1.8 billion in 2007 to \$14.6 billion in 2011 (*Chart 3*).

It is difficult to determine how much of the \$14.6 billion is local and how much is spent outside the region. Many project costs are incurred at company headquarters in Dallas, Houston or San Antonio—geology, geophysics, engineering, finance, personnel and accounting—and will have little effect on the South Texas economy. A number of sophisticated services will never be housed in the area, but expertise will be regularly imported from other Texas cities. Workers will visit the region and spend at local restaurants and hotels, but their employers won't likely relocate their payrolls to South Texas. Some spending leaving the region today could become locally established over time. Because these 23 counties produced oil and gas before the Eagle Ford boom, the solid base of oil service companies in the area will likely continue expanding.

Existing South Texas oil and gas pipelines, gathering systems, gas processing plants

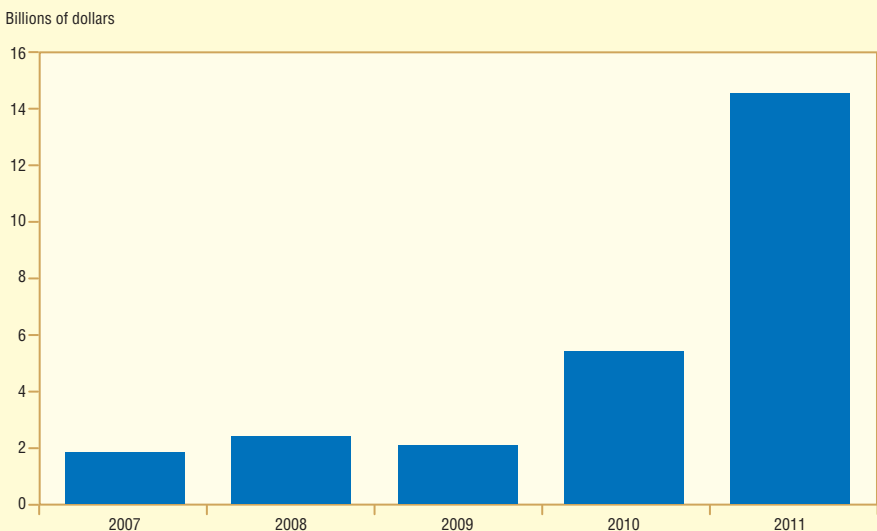
and other infrastructure were quickly overcome by new Eagle Ford development. Oil and condensate are moved by truck and rail to market until infrastructure can catch up. Pipeline companies such as Enterprise Product Partners, Energy Transfer Partners, Kinder Morgan and NuStar are committing billions of dollars to gather and transport Eagle Ford production to the Gulf Coast. An updated, May 2012 UTSA study estimates total pipeline development and other hydrocarbon-related construction at \$775 million in 2011.

Once production is established on a lease, it remains in effect as long as the property produces oil and gas. The mineral rights owner is paid a royalty, or share (20–25 percent is common in Texas) of the value of the hydrocarbons produced. In our 23-county area—using Railroad Commission production records and applying market prices—oil, natural gas and condensate revenues grew from \$5.3 billion in 2007 to \$8.2 billion in 2011. Based on a 20 percent royalty, local payments increased by \$584 million in the 2007–11 period. This income can be unstable or unpredictable from year to year, and like lease payments, is often treated as an addition to wealth rather than an increase in income, with about 5 to 7 percent generating local spending.<sup>11</sup>

Direct expenditures associated with drilling have a multiplier effect, as business-to-business or consumer-to-business spending continues through successive rounds. In addition to these indirect effects, rising

*Direct expenditures associated with drilling have a multiplier effect, as business-to-business or consumer-to-business spending continues through successive rounds.*

**Chart 3**  
**Eagle Ford Estimated Drilling Expenditures Jump**



SOURCES: Texas Railroad Commission; authors' calculations.

*Surging drilling activity has brought strong employment and wage growth to most of the counties in the Eagle Ford.*

local income can induce additional household spending. UTSA's Eagle Ford analysis found combined and induced output multipliers of 1.19, lower than the 1.3–1.5 typical of other studies.<sup>12</sup> Industries that stand out as the biggest winners from the combination of direct, indirect and induced spending are consistent across most studies—as well as in the Eagle Ford—and include oil exploration and services, construction, wholesale and retail trade, and real estate.

### Impact on Jobs and Retail Sales

Since the Eagle Ford Shale discovery in 2008, drilling and exploration have had a strong positive economic impact in South Texas. Most of the 23 Eagle Ford counties are rural, with a history of cattle ranching, hunting and some traditional oil and gas drilling. For the five counties where the job growth rate has been the strongest—McMullen, Dimmit, La Salle, Live Oak and Lee—seasonally adjusted retail sales grew at an annual rate of 55.1 percent, or \$100.9 million, from first quarter 2010 to third quarter 2011. For the entire 23-county area, seasonally adjusted retail sales increased at a 15.4 percent annual rate, or \$580.7 million. During this period, comparable retail sales rose 7.2 percent in the U.S. and 6 percent in Texas.

This strong retail sales growth in the Eagle Ford counties has led to sharply increased state sales tax payments. For the 23 counties, retail sales tax revenue advanced at an annual rate of 9.3 percent, or by \$8

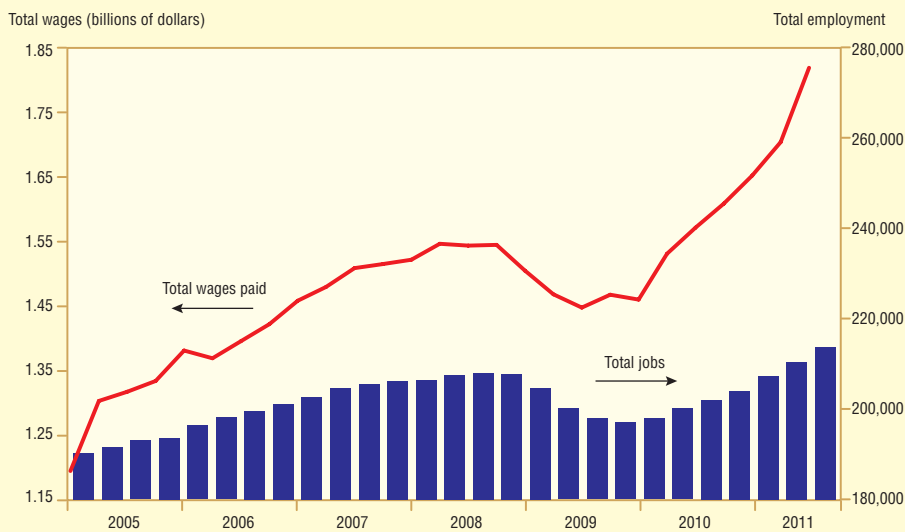
million, from first quarter 2010 to third quarter 2011. While these 23 primarily rural counties account for only 2.9 percent of Texas retail sales, they are responsible for about 5 percent of the increase in state sales tax revenue since early 2010.

Surging drilling activity has brought strong employment and wage growth to most of the counties in the Eagle Ford. Counties located above oil and condensate deposits, such as Dimmit, La Salle and McMullen, have experienced the greatest increase in employment and average weekly wages. Job growth was strong from 2005 to 2008, likely fueled by rising natural gas prices even before the Eagle Ford Shale play began (*Chart 4*).

Jobs in the region sank with the recession amid sharply dropping energy prices in 2009. From a low during first quarter 2010 to third quarter 2011, jobs grew at an annual rate of 5.9 percent, reaching 2.9 percent above the previous peak value. By comparison, during the same period, jobs statewide increased 2.4 percent and remained 0.01 percent below the previous high. Generally, Eagle Ford counties represent about 2 percent of all Texas jobs. Since the beginning of 2010, the 15,773 net new jobs account for 6.9 percent of the state's net gain during the period. While recent activity is impressive, more growth may lie ahead to meet demand. The scale of development has surpassed the capacity of local industry. Hotels, restaurants and gasoline stations are jammed with outside managers, crews and technicians. As the Eagle Ford matures and the local service industry expands, many outside workers may become local residents and employees.

Average weekly wages have grown markedly in most Eagle Ford counties. Weekly wages in Dimmit County increased the most from first quarter 2010 to third quarter 2011, at an annual rate of 35.8 percent, from \$555 to \$880. Live Oak County pay rose 25.5 percent, from \$585 to \$823, and in McMullen County, wages climbed 25.1 percent, from \$635 to \$890. Once again, counties located above natural gas liquids and oil deposits experienced more significant average weekly wage increases than other Eagle Ford counties. For the 23 counties, the average annualized growth rate in the weekly wage during this period was 14.6 percent. By comparison, average weekly wages rose 6.8 percent in Texas, from \$875 to \$966, and 6.3 percent in the U.S., from \$870 to \$953. Given the strong growth in employment and average weekly wages in the Eagle Ford, seasonally adjusted total

**Chart 4**  
**Employment and Total Wages Accelerate in Eagle Ford Counties**



SOURCE: Bureau of Labor Statistics.

wages paid in its top five counties increased at an annual rate of 63.4 percent during this period, while the entire 23-county area saw a 25 percent increase.

## Robust Growth to Continue

The data clearly indicate that the surge in Eagle Ford Shale drilling has already produced sharp gains in economic activity across the region. This is no surprise to those living and working in the area—news reports in recent months have noted housing shortages, frequent waits for tables at restaurants, traffic, road damage and grocery store shelves picked clean.

It is difficult to estimate how activity will change over the next several years. Sharply dropping natural gas prices in the past year have redirected drilling to areas with oil and condensates and away from dry gas regions. As long as oil prices stay above \$70 per barrel, drilling activity probably will remain strong; at less than \$70, drilling activity likely would begin falling off, industry contacts suggest. Energy prices are difficult to predict. However, the billions of dollars that large energy companies are committing to expand infrastructure for delivering hydrocarbons to the Texas Gulf Coast signal anticipation of strong production from this region for many years to come.

*Gilmer is a senior economist and vice president at the Federal Reserve Bank of Dallas, Hernandez is an intern in the Bank's San Antonio Branch and Phillips is a senior economic policy advisor at the San Antonio Branch.*

## Notes

<sup>1</sup> Totals represent all new-well drilling permits originating in the 23-county region, net of cancellations, withdrawals and repair. The 23 counties were selected after consultation with the Texas Railroad Commission regarding the commission's currently published map. The commission considers the map a better guide to exploration activity than the current 24-county list published to describe Eagle Ford Shale. Additionally, the list has changed several times in the past, according to the commission. Most of the activity is concentrated in a handful of counties, and other studies of the region will remain broadly comparable.

<sup>2</sup> For example, a study of the Eagle Ford completed in late 2010 and published in early 2011 estimated that new Eagle Ford production in 2011 would amount to 8.7 million barrels of oil and 117 billion cubic feet of natural gas. The actual numbers for 2011 were 30 million barrels of oil and 243 billion cubic feet of natural gas. See "Economic Impact of the Eagle Ford Shale," Center for Community and Business Research, University of Texas at San Antonio Institute for Economic Development, February 2011. UTSA released an update to this study in May 2012. A similar example of studies that needed to be repeated

to catch up with very rapidly moving events can be seen in "The Pennsylvania Marcellus Natural Gas Industry: Status, Economic Impacts and Future Potential," by Timothy J. Considine, Robert Watson and Seth Blumsack, Pennsylvania State University, July 20, 2011, Table 2, p. 11.

<sup>3</sup> There are many issues beyond the scope of this article, such as environmental impacts; implications for state and local finances; the spillover of local impacts onto San Antonio or Texas Gulf Coast cities, including Corpus Christi and Houston; and speculation on how far oil shale can move the U.S. toward energy self-sufficiency.

<sup>4</sup> This includes natural gas production from gas wells or associated with oil wells.

<sup>5</sup> For a current map of the Eagle Ford production zones, see [www.eia.gov/oil\\_gas/rpd/shaleusa9.pdf](http://www.eia.gov/oil_gas/rpd/shaleusa9.pdf) on the U.S. Energy Information Administration website. For a map with shale drilling activity, see [www.rrc.state.tx.us/eagleford/index.php](http://www.rrc.state.tx.us/eagleford/index.php) on the Texas Railroad Commission website.

<sup>6</sup> Recent wellhead prices for natural gas have fallen to near \$2 per thousand cubic feet as a result of an extremely warm winter that limited demand for heating in the large Midwest and Northeast markets. Natural gas in storage was 65 percent above normal levels going into the spring, strongly pressuring natural gas prices. Over the longer term, natural gas prices will move past the weather to focus on fundamental demand growth and cost recovery. A price of \$4 is often cited as necessary to recover the cost of drilling, and \$6 to recover all corporate overhead and provide an adequate rate of return on capital.

<sup>7</sup> See note 2, "Economic Impact of the Eagle Ford Shale," p. 15. The 2012 update to the UTSA study estimated only \$150 million in lease payments were made in 2011, as the amount of available land diminished sharply.

<sup>8</sup> One recent list of only the 28 largest leaseholders in the area put the leased total above 5 million acres. See "After Shaky Start, South Texas Eagle Ford Shale Soars to Top Play," by Rachael Seeley, *The Oil Daily*, Nov. 9, 2011.

<sup>9</sup> This is just an application of the marginal propensity to consume from wealth. Most studies of the U.S. find values that range from 4 to 7 cents per dollar. Typical is "Perspectives on the Household Saving Rate," by William G. Gale and John Sabelhaus, *Brookings Papers on Economic Activity*, no. 1, 1999, pp. 181–224. For an application to this problem, see "The Economic Impact of the Haynesville Shale on the Louisiana Economy in 2008," Loren C. Scott & Associates, April 2009.

<sup>10</sup> These permits are restricted to those for new drilling directed to oil and gas, less canceled and withdrawn permits, and excluding sidetrack permits for borehole repair operations.

<sup>11</sup> This may be especially true in the Eagle Ford Shale, where initial production is prolific the first year, then quickly falls by 80 to 90 percent before stabilizing. This is good for the economics of the wells—offering producers a quick return on investment—but it may mean that leaseholders should use caution when predicting future income from royalties.

<sup>12</sup> See note 2, "The Pennsylvania Marcellus Natural Gas Industry: Status, Economic Impacts and Future Potential," p. 16. Considine, Watson and Blumsack cite oilfield development multipliers of 1.34 for spending in Louisiana, 1.43 for New Mexico and 1.55 for Oklahoma. For the Marcellus Shale, they found a much higher multiplier of 2.

*The billions of dollars that large energy companies are committing to expand infrastructure for delivering hydrocarbons to the Texas Gulf Coast signal anticipation of strong production from this region for many years to come.*

## Georgia Data Quantify Impact of Undocumented Workers

**Julie Hotchkiss, research economist and policy adviser at the Federal Reserve Bank of Atlanta and an adjunct professor at Georgia State University, obtained access to unique data that contain virtually all the wage records of Georgia's workforce. She and her coauthors devised an algorithm based on millions of wage records between 1990 and 2009 to identify undocumented workers' experiences.**

**Q. Where are undocumented workers employed in Georgia, and how has that changed over time?**

**A.** Between 1990 and 2000, Georgia experienced one of the nation's fastest-growing populations of undocumented workers. According to our data, that workforce increased about 500 percent during the decade (roughly matching other estimates for Georgia during the period). Since 2000, growth has slowed significantly but still averaged about 7 percent annually from 2000 to 2009.

Of course, most undocumented workers are employed geographically where demand for their labor is greatest. Twelve percent of undocumented workers in Georgia in 2009 were in manufacturing, so it's natural that we would see a concentration of them in the north and northwest parts of the state, where a significant amount of agricultural and textile production occurs. Additionally, 26 percent of undocumented workers in 2009 were in leisure and hospitality, 14 percent were in services such as temporary help and landscaping and janitorial and 12 percent were in construction. Consequently, we would expect to see—and do see—a concentration of employment around urban centers such as Atlanta, Macon and Columbus, where demand for these types of skills is the greatest.

**Q. According to your data from Georgia, how do the wages of undocumented workers compare with those of documented workers? Is there any evidence that undocumented workers are exploited by being paid below their worth?**

**A.** Workers' wages can differ for various reasons. One worker might get paid more than others because he has a particularly risky or unpleasant job. Another worker might get paid more because she is especially productive. And yet another might agree to a lower



wage because he has limited alternative job opportunities. In this last case, the worker might be so limited that the employer can get away with paying the worker less than his productivity. It's in this case where we might say the worker is being "exploited." The firm is taking advantage of a superior market position to pay a worker less than he is worth. We can imagine that undocumented workers, with limited English skills and fear of being deported, present the perfect opportunity for exploitation—and we find some evidence of this in our research.

On average, across all workers, we estimate that the undocumented earn about half the amount documented workers receive annually. There are several reasons. Primarily, they tend to be concentrated in industries more likely to employ low-skilled workers (because they, themselves, are typically low-skilled). Those sectors include leisure and hospitality, and service activities such as landscaping and janitorial.

Additionally, undocumented workers typically have fewer years of experience in the Georgia labor market and fewer years of

tenure with their current employer—employers typically reward experience and tenure with higher wages. We also are more likely to see undocumented workers employed by smaller firms; such companies pay all their workers lower wages, on average, than larger firms. It could be the case that undocumented workers work fewer hours each week, on average, than documented workers. Unfortunately, we do not have any information on hours of work in our dataset.

Ideally, in order to obtain a more accurate picture of wage differentials between documented and undocumented workers, we would compare earnings of workers employed by the same firm. This allows a comparison of earnings that holds constant the size of the firm and its industry, for example, as well as any other characteristics that we can't observe but might be important in the decision of what to pay. When we do this, we find that documented workers earn about 30 percent more than undocumented workers (within the same firm). Now, some of this differential results from the greater labor market experience and tenure that documented workers have; these characteristics translate into greater productivity and, thus, higher wages. Controlling for the greater productivity of documented workers leaves only an 8 percent wage differential. This difference appears to be the result of employers taking advantage of undocumented workers' limited job opportunities to pay them less than they're worth.

**Q. Does the presence of undocumented workers reduce the wages of documented workers? What about the arrival of new undocumented workers?**

**A.** One of the most commonly cited concerns about the presence of undocumented workers in the labor market is that they will displace documented workers. Our research shows that newly arriving undocumented workers appear to displace only earlier-arriving undocumented workers. This makes sense since undocumented workers are going to be the closest substitutes for each other.

In contrast to the finding that documented workers are not displaced, we find that



*“Our research shows that newly arriving undocumented workers appear to displace only earlier-arriving undocumented workers.”*



a documented worker whose employer also has undocumented workers earns a lower wage than if he/she worked for an employer that did not employ undocumented workers. Overall, however, this wage effect is fairly negligible—0.15 percent less than if the employer hired no undocumented workers. This amounts to earnings that are \$52 less per year, arguably a negligible amount.

The wage penalty experienced by documented workers when their employer also hires undocumented workers varies across industries, with those in the agriculture and professional and business services sectors taking the biggest hit. When their employers hire an average number of undocumented workers, the documented in agriculture earn \$769 less per year and their counterparts in professional and business services receive \$427 less.

**Q. How do firms that hire undocumented workers do over time? Are they more or less successful than other firms?**

**A.** One would expect that an employer paying some workers less than what they are actually contributing to profit would be at a competitive advantage relative to rivals that are not employing undocumented workers. We tested this hypothesis by looking at firms' survival rates and found that those employing undocumented workers survive longer in the market than a near-identical firm that does not employ undocumented workers.

The advantage gained from employing undocumented workers differs based on the firm's characteristics. For example, companies with more low-skilled workers or that have a relatively labor-intensive production process gain more from employing undocumented workers than their colleagues that use higher-skilled workers in a capital-intensive production process. Additionally, firms that supply a broader market (and are likely to be competing with foreign competition with access to even cheaper labor) also benefit more from employing undocumented workers than a firm without that sort of competitive pressure. But the strongest benefit from employing undocumented workers goes to firms whose competitors already employ undocumented workers.

**Q. In this research, what surprised you about the results?**

**A.** In response to your question about whether the presence of undocumented workers reduces documented worker wages, there was one thing I didn't expect: Documented workers in two broad sectors, leisure and hospitality and retail trade, actually earn a wage premium if their employers also employ undocumented workers.

One might expect that hiring undocumented workers could generate what is referred to as a scale effect, which means that in response to having access to a new, cheaper source of labor, firms would increase production, increasing demand for all workers, which would raise wages for documented workers. But if this were the case, we should observe a premium in all industries.

There is another theory, however, that would explain the presence of a wage premium only in sectors such as leisure and hospitality and retail trade. It states that the arrival of low-skilled undocumented workers, especially workers with limited English capabilities, allows documented worker specialization in tasks that require better communication skills. And the industries in which we would expect to see this occurring are those in which communication and customer interaction are relatively important—such as in the leisure and hospitality and retail trade sectors.

**Q. Can you tell us more about your data and how you were able to identify undocumented workers?**

**A.** Because of its fundamental concern with employment conditions of all workers in the state, the Georgia Department of Labor established a relationship in the mid-1990s with the Andrew Young School of Policy Studies at Georgia State University. It allows researchers access to highly confidential data in order to investigate issues related to the Georgia labor market and its workers. Because of my affiliation with Georgia State University, I can access these data for research purposes.

The numbers used in our analyses come from the Georgia Department of Labor's administration of the unemployment insurance

program. Each quarter, employers covered under that program (about 97 percent of all employers) must report the Social Security number (SSN) and amount paid each month for everyone on their payroll. No other identifying worker information is included. We make use of the Social Security Administration's publicly provided information to determine whether a SSN is valid. There is a surprisingly large number of ways in which an SSN can be invalid. We conclude that some result from either errors or incomplete recordkeeping by firms. We restrict our identification of undocumented workers to invalid SSNs that are more likely to have been generated by the worker—numbers that look valid but are not.

One of the implications of this conservative approach is that we end up with a sample of undocumented workers that represents only about 20 percent of what others have estimated as the size of the Georgia undocumented workforce. Consequently, our results likely underestimate the true impact of the presence of undocumented workers on the labor market. Also, since our data come only from Georgia, the results are generalizable to the rest of the U.S. only to the extent that the state's labor market and its employers reflect those in other states.

Before we wrap up, let me come back to your question about what surprised me in doing this research. Talking about SSNs reminded me of it, and it's interesting as a cultural anomaly. A series of SSNs have been decommissioned by the Social Security Administration because, decades ago, they were put on fake Social Security cards used as props to sell wallets. Apparently, some people who purchased the wallets thought the fake Social Security cards were real and started using them as their own. We did, indeed, find some occurrences of these “pocketbook” SSNs in our data and, of course, flagged them as invalid.

# Mexico Resilient in 2011 Amid Global Uncertainty and Sluggish U.S. Growth

By Jesus Cañas

*The recent performance overcame a period of heightened European financial tension, sluggish growth in the U.S. and global supply-chain disruptions related to Japan's natural disasters.*

**M**exico navigated a new wave of international financial volatility during the second half of 2011, growing 3.9 percent for the year—slower than the 5.5 percent pace in 2010 but ahead of the 2.2 percent annual average of 2001–11.

The recent performance overcame a period of heightened European financial tension, sluggish growth in the U.S. and global supply-chain disruptions related to Japan's natural disasters.

Weaker manufacturing output growth and a 2.3 percent decline in oil activity slowed expansion in 2011. Agricultural output also stagnated in 2011, while construction improved after experiencing no growth in 2010. The 2012 consensus forecast for a 3.4 percent rate of expansion is modest compared with the prior two years' data (*Chart 1*).

In contrast to the U.S. upturn, robust job

growth has characterized Mexico's recovery since the 2009 recession. Formal-sector employment—defined as workers covered by Mexico's social security system—grew 4.1 percent in 2011, with more than 600,000 jobs created. Manufacturing accounted for 27 percent of the new jobs, while trade was responsible for 25 percent and business services for 18 percent.

Domestic demand also bounced back. Buoyed by relatively healthy banks, rising household credit and greater employment, retail sales increased 3.1 percent in 2011—sales volumes surpassed the precrisis peak year of 2008. Household credit rose 19 percent in 2011 after posting no growth in real terms in 2010.

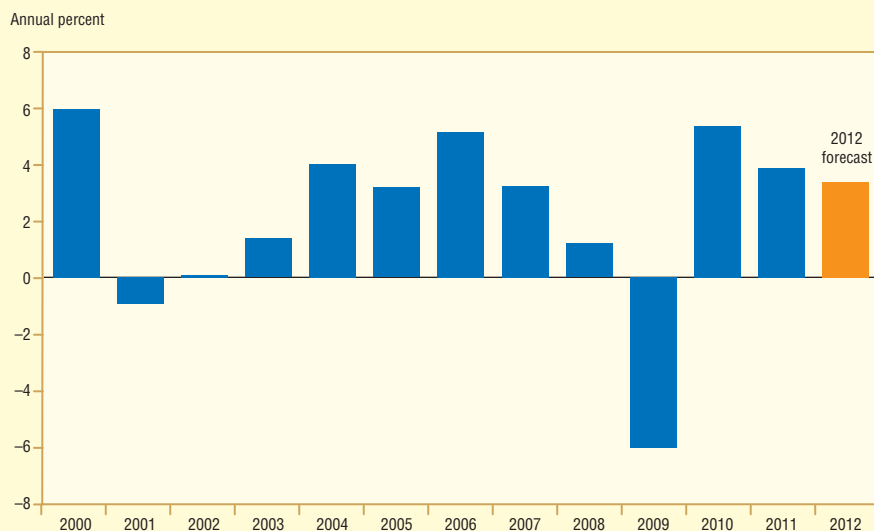
## Manufacturing and Trade Growth

Mexico's rebound began in summer 2009, led by manufactured goods exports to the U.S., where the recession had ended that June.<sup>1</sup> This reliance on manufacturing and exports leaves Mexico vulnerable to global events. Notably, Japan's earthquake, tsunami and nuclear incidents in March 2011 arrested Mexican manufacturing growth. After annual average expansion of 6.8 percent during first quarter 2011, Mexico manufacturing decelerated in the second quarter to 5 percent as supply-chain disruptions took hold. Anecdotal evidence indicates that Mexican plants scaled back production, reflecting increased lead times for machine tools, wire harnesses and other Asia-made inputs.

In the second half of 2011, when uncertainty abated, supply chains were re-established and orders returned to Mexican facilities. Manufacturing production rose 4.8 percent year over year, with manufacturing exports gaining 10 percent. Total exports grew 14 percent in 2011.

Mexico continues to be one of the best manufacturing platforms to meet U.S.

**Chart 1**  
**Mexico's Gross Domestic Product Grows 3.9 Percent in 2011**



SOURCES: Instituto Nacional de Estadística y Geografía; Banco de México Survey of Private Analysts (forecasts).

demand. Proximity, quick turnarounds on manufacturing design changes and a skilled and experienced manufacturing labor force are important advantages (see the box “Intra-Industry Trade: The U.S.–Mexico Connection in Import, Export Data” on page 13).<sup>2</sup>

Transportation equipment manufacturing, which includes motor vehicle production, has been crucial to Mexico’s recent economic recovery and impressive job growth. Transportation equipment employment growth averaged 17.1 percent in 2011, up from 12.6 percent in 2010 (Chart 2). The sector represents 22 percent of Mexico’s manufacturing production and 17 percent of its manufacturing employment. Thus, the uncertain performance of the U.S. economy and the question of whether the recent run-up in U.S. automotive demand can be sustained remain significant downside risks for Mexico.

### Withstanding Global Shocks

Mexico also navigated financial disruption in Europe in the latter half of the year. When global markets go awry, investors withdraw capital from emerging markets in search of safer outlets. The premium Mexico must pay on its debt relative to comparable U.S. instruments jumped more than 55 percent from July to September and reached levels not seen since July 2009 (Chart 3).

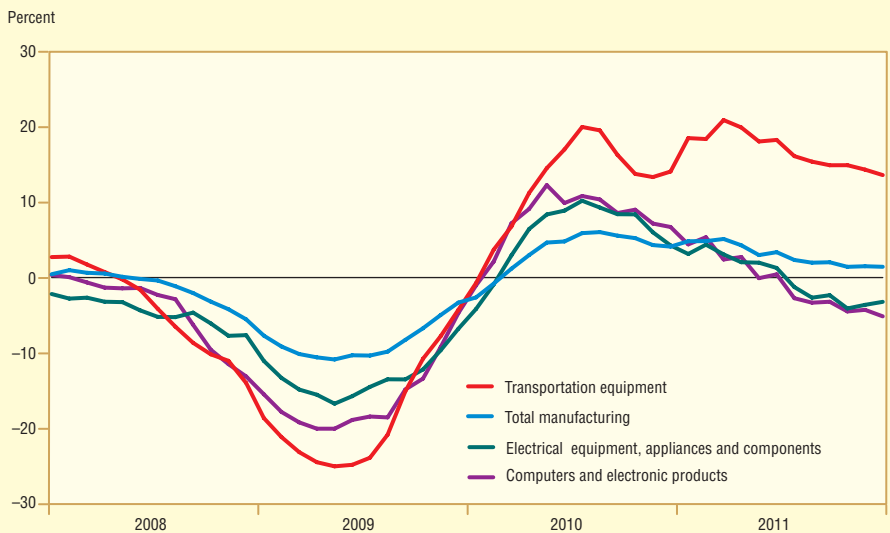
Foreign portfolio investment in Mexico, which tripled in 2010, grew just 4.1 percent in 2011. The diminished rate of investment flows helps explain a 15 percent peso depreciation against the dollar from July to December. In turn, the weaker peso fueled increased imported goods prices, pushing up inflation by year-end.

Mexico’s solid macroeconomic fundamentals and the credibility policymakers earned over the past decade helped persuade the international community that the inflation pickup and peso depreciation were transitory.<sup>3</sup> After spiking during the third quarter, the global Emerging Markets Bond Index spread declined significantly. And, in a vote of confidence by international investors, Mexico in January issued \$2 billion in 10-year bonds yielding 3.7 percent, the lowest rate the country has obtained for the maturity. Additionally, financial markets stabilized, with inflation slowing from November’s levels.

### More Remains to Be Done

Although Mexico has navigated recent global volatility and maintained monetary policy discipline and macroeconomic stability, economic development still languishes. Fiscal

**Chart 2**  
**Transportation Equipment Drives Mexico Job Growth**  
(Manufacturing employment, 12-month change)



SOURCE: Haver Analytics, with data from Instituto Nacional de Estadística y Geografía.

**Chart 3**  
**Country Premium Stabilizes After European Union Scare**  
(Emerging Markets Bond Index and Mexico sovereign-debt spread over U.S. rates)



NOTE: The Emerging Markets Bond Index tracks total returns for international government bonds issued by emerging-market countries. SOURCES: J.P. Morgan; Bloomberg.

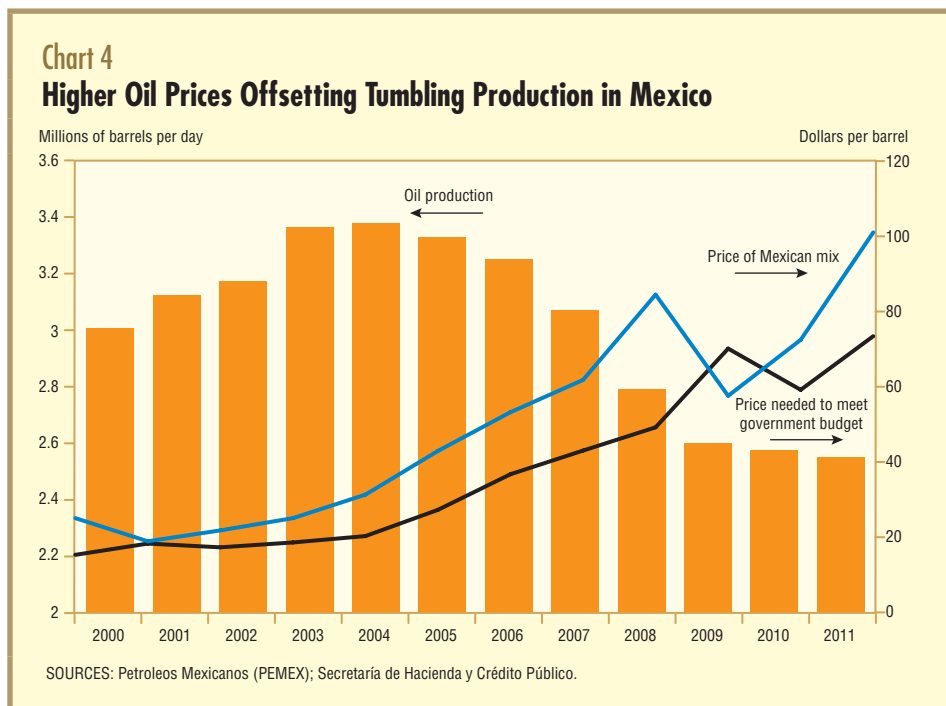
dependence on oil revenue, an inability to modernize oil production, rampant drug-related violence and lack of educational reform constrain growth.

Mexican crude oil production reached a new low last September, 2.48 million barrels per day. In total, output declined about 25 percent from the 2004 peak. Poorly maintained and aging equipment, along with a

failure to implement new technologies, raises the cost of oil production and feeds inefficiency. Moreover, the federal government takes about 50 percent of revenues from national oil company Pemex, draining it of capital-improvement and exploration funding.

Mexico is highly dependent on oil, which accounts for about 34 percent of government revenue. Higher prices and forward

*The Mexican government can't always depend upon good luck and the globally determined price of oil to fund itself.*



thinking by some government officials have offset falling production (*Chart 4*). Mexico hedged all of its 2009 oil exports at \$70 a barrel, resulting in a more than \$5 billion gain when the price of the Mexican mix collapsed to \$57 a barrel. In January, Mexico hedged an additional 211 million barrels—about 580,000 barrels a day—at \$85 a barrel in anticipation of an economic downturn in 2012. However, the Mexican government can't always depend upon good luck and the globally determined price of oil to fund itself. Mexico's ability to collect taxes is abysmal, with tax revenues, excluding oil, totaling just 14 percent of gross domestic product.

Mexico has experienced an unprecedented rise in crime and violence over the past five years, with more than 47,000 people killed. The economic impact of this is significant, yet hard to quantify. Official statistics show that total foreign direct investment (including new investment, reinvested earnings and parent company accounts) fell 6.6 percent in 2011 after growing 24 percent in 2010. Especially telling is that new investment, excluding reinvested earnings and parent company accounts, declined 42 percent in 2011. While foreign direct investment flows may provide clues about the impact of increasing violence on investment decisions, it is unclear how much of the decline can be attributed to skittish investors or the global slowdown during the second half of 2011.

In the past two decades, Mexico has made great educational strides. Public assistance programs such as Oportunidades link

payments to children's school attendance and have effectively improved performance in rural areas.<sup>4</sup> Nevertheless, Mexico still trails in terms of educational attainment. Upper-secondary education, such as preparatoria, vocational high schools and technical programs, provides the basis for advanced learning and training opportunities and prepares some students for entry into the labor market. Still, Mexico ranks second-to-last among Organization for Economic Cooperation and Development countries in upper-secondary education achievement, with a graduation rate of only 45 percent.<sup>5</sup> Additionally, a significant proportion of young Mexicans remain inactive. About 25 percent of 15- to 29-year-olds are neither in school nor in the labor force. Significant and rising numbers of young people lacking both education and jobs could potentially contribute to greater social instability.<sup>6</sup>

### Exceeding the Consensus Forecast

While private analysts predict slower growth in 2012, there is potential for the Mexican economy to exceed the consensus forecast. First, the Blue Chip consensus forecast predicts faster U.S. economic growth this year. Second and more important to Mexico, analysts also anticipate strong industrial production growth and a pickup in auto and light-truck sales.

However, risks to the Mexican economy remain significant. An unanticipated acceleration of a global slowdown that impacts external demand will affect the U.S. first and Mexico later, just as it did in 2008 and 2009.<sup>7</sup>

In addition, oil prices may drop significantly. Mexico's July 2012 presidential election also poses a challenge because growing political uncertainty could slow growth if consumers, businesses or foreign investors hold back on spending as they await the outcome of balloting. Even though Mexico has yet to address many areas of vulnerability, solid macroeconomic fundamentals have allowed the country to successfully navigate another wave of global volatility, proving to the international community that it is well-fortified to withstand further external shocks.

*Cañas is an associate economist at the Federal Reserve Bank of Dallas.*

### Notes

<sup>1</sup> See "Mexico Rides Global Recovery but Still Faces Hurdles," by Jesus Cañas, Roberto Coronado and Robert W. Gilmer, *Southwest Economy*, Third Quarter 2011.

<sup>2</sup> See "Maquiladora Recovery: Lessons for the Future," by Jesus Cañas, Roberto Coronado and Robert W. Gilmer, *Southwest Economy*, March/April 2007.

<sup>3</sup> See "The Conquest of Mexican Inflation," by Mark Wynne and Edward C. Skelton, Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute 2011 Annual Report.

<sup>4</sup> Oportunidades is a government social-assistance program

designed to target poverty by providing cash payments to families in exchange for regular school attendance, health clinic visits and nutritional support.

<sup>5</sup> See "Education at a Glance 2011," Organization for Economic Cooperation and Development, September 2011.

<sup>6</sup> See "The United States Should Borrow Mexico's Fiscal Discipline Manual (With Reference to Cantinflas, Guillermo Ortiz's Quip, Inflation Targeting and Many Comparative Metrics)," speech by Richard Fisher, Federal Reserve Bank of Dallas president, before the Bolsa Mexicana de Valores, Mexico City, Feb. 29, 2012.

<sup>7</sup> For details, see "Mexico's Año Horrible: Global Crisis Stings Economy," by Edward C. Skelton and Erwan Quintin, Federal Reserve Bank of Dallas *Southwest Economy*, Third Quarter 2009.

## Intra-Industry Trade: The U.S.–Mexico Connection in Import, Export Data

Mexican trade—exports plus imports—reached \$700.5 billion in 2011, with the U.S. representing about 65 percent of the total. Asia followed with 17 percent, Europe with 9 percent and Latin America with 6 percent.

The volume and composition of Mexican trade have significantly changed over the past 30 years. In 1980, trade as a percentage of gross domestic product was only 17.5 percent; today it represents 62 percent of economic output. Also in 1980, oil accounted for 58 percent of Mexico's exports; today, it's responsible for only 16 percent.<sup>1</sup> Thanks to the nation's evolution into a world-class manufacturer, some 80 percent of Mexico's exports are now manufactured goods.

A significant portion of U.S.–Mexico trade is intra-industry—trade that occurs within industries using similar factors of production on both sides of the border, spreading production across countries as

each specializes in what it does best.<sup>2</sup> The table below lists the 10 largest U.S. imports from Mexico and the 10 largest U.S. exports to Mexico in 2011. Seven items appear on both lists, indicating extensive intra-industry trade.

As a result of highly integrated production processes between the two countries, Mexico's industrial production is highly correlated with that of the U.S. For example, transportation equipment was the top U.S. import from Mexico and the second-largest export to Mexico. Computer and electronic products was the second-largest U.S. import from Mexico and the top U.S. export to Mexico. This two-way exchange implies each country is sending the other the same product, just at different stages of production. In the transportation equipment category, U.S. factories send engines and navigation software across the border, while Mexico returns assembled cars back to the U.S.

The automotive industry plays an important and expanding role in U.S.–Mexico trade. Mexico saw its share of road vehicle production for the U.S. jump from 13.5 percent in 2005 to 22.3 percent in 2010. Outsourcing to Mexico increased during the recession, when U.S. automakers struggled to stay afloat.

### Notes

<sup>1</sup> See "The United States Should Borrow Mexico's Fiscal Discipline Manual (With Reference to Cantinflas, Guillermo Ortiz's Quip, Inflation Targeting and Many Comparative Metrics)," remarks by Richard Fisher, Federal Reserve Bank of Dallas president, before the Bolsa Mexicana de Valores, Mexico City, Feb. 29, 2012.

<sup>2</sup> See "U.S.–Mexico Trade: Are We Still Connected?" by Jesus Cañas and Roberto Coronado, Federal Reserve Bank of Dallas *Business Frontier*, no. 3, 2004.

## U.S. Trade with Mexico, 2011

Rank	NAICS code*	Imports from Mexico	Billions of U.S. dollars	Rank	NAICS code*	Exports to Mexico	Billions of U.S. dollars
1	336	Transportation equipment	60.9	1	334	Computer and electronic products	36.2
2	334	Computer and electronic products	52.3	2	336	Transportation equipment	23.6
3	211	Oil and gas	40.2	3	325	Chemicals	21.4
4	335	Electrical equipment, appliances and components	18.1	4	324	Petroleum and coal products	20.1
5	331	Primary metal manufacturing	14.4	5	333	Machinery except electrical	15.7
6	333	Machinery except electrical	14.0	6	331	Primary metal manufacturing	9.8
7	111	Agricultural products	7.4	7	335	Electrical equipment, appliances and components	9.2
8	339	Miscellaneous manufactured commodities	6.7	8	311	Food and kindred products	9.1
9	332	Fabricated metal products	6.0	9	111	Agricultural products	8.4
10	311	Food and kindred products	5.8	10	326	Plastics and rubber products	7.2
		Subtotal	225.8			Subtotal	160.7
		Other	36.9			Other	36.8
		Total	262.7			Total	197.5

\*North American Industry Classification System.  
SOURCE: U.S. International Trade Commission.

**QUOTABLE:** *“In the medium to long term, the regional outlook is still a function of U.S. fundamentals, which have not improved much from last year.”*

—Pia Orrenius, Assistant Vice President and Senior Economist



## TEXAS TOURISM: Gas Price Spike Could Lead to Fewer Pleasure Trips

This spring’s gasoline price spike could promote more “staycations” and fewer road trips in 2012.

Texas tourism generated gross domestic product of \$23.4 billion in 2010, or about the same as the agriculture and food production industry, according to a study commissioned by the governor’s office. Tourism spending totals \$48 billion, 55 percent from Texans. Outside visitors make 198 million annual trips to the state, 70 percent for pleasure.

Gasoline prices this spring are up more than 20 percent from last December—more than six times the annual rate of the consumer price index. The short-term price elasticity for fuel—a measure of how motorists’ gasoline use is affected by prices—suggests that consumption could fall about 4 percent in 2012 if prices rise 30 percent, as they did during the

2008 oil spike, according to the Federal Highway Administration. Because it’s harder to cut back essential job- and school-related trips when fuel prices climb, consumers trim elsewhere.

Texas gasoline sales rose 2 percent in 2011, which partially reflects an increase in traffic. Motorists racked up 106 million daily vehicle miles in Dallas–Fort Worth, 82 million in Houston and 41 million in San Antonio.

Grand Prairie, Texas-based amusement park operator Six Flags Entertainment acknowledged the travel wildcard in its annual report, saying its business is vulnerable to “general economic conditions, including relative fuel prices, and changes in consumer spending habits.”

—Michael Weiss



## BANKING: Profitability and Lending Rise as Problem Loans Fall

Commercial banking—nationally and in the Eleventh District—continued recovering from the financial crisis, with profitability and asset quality strengthening in 2011.

Banks nationally reported a return on assets of 0.92 percent last year, up from 0.65 percent in 2010.

Eleventh District institutions continued outperforming their counterparts nationwide, with a return on assets of 1.13 percent, the first time since 2007 that they reported a full-year return exceeding 1 percent.

A decline in the amount set aside to cover bad loans—now at levels last seen in 2007—was the major profitability contributor.

Asset-quality difficulties continued abating, with the proportion of loans 90 days or more past due falling to 4.1

percent last year at banks across the nation, compared with 4.9 percent in 2010. Eleventh District banks fared even better, with a noncurrent loan rate of 2.4 percent in 2011, down from 3 percent in 2010.

Among banks nationwide, one- to four-family residential mortgage loans still dominated the noncurrent category; for district banks, commercial real estate loans were the major problem source.

Lending rose 1.8 percent nationally and 3.1 percent in the Eleventh District in 2011. Business borrowing also increased, up 7.1 percent nationally and 2.4 percent in the district. However, loans to small businesses registered a decline.

—Kenneth J. Robinson



## AGRICULTURE: Sector’s Share of GDP Smaller in Texas than in U.S.

Texas is one of the top agriculture states, accounting for 7 percent of the value of U.S. agricultural products sold. The Texas food and fiber system—more broadly encompassing agricultural production and associated economic activities—is responsible for an estimated 8.6 percent of state gross domestic product (GDP), according to Texas AgriLife Research.

Yet agricultural production in Texas represents only 0.6 percent of state GDP. More surprising, the figure is less than agriculture’s 1.1 percent share for the U.S. as a whole. How can the nation’s second-largest agriculture producer have a lower ratio of agriculture-to-total GDP than the U.S.?

Texas has relatively low agriculture productivity, ranking 43rd when measured as output (gross production) divided

by inputs (capital, land, labor and goods used in production), according to the U.S. Department of Agriculture. No. 1-ranked California and second-place Florida produce higher-value products such as fruits and nuts. Texas’ relatively less-productive land requires more inputs for successful production—mostly of low-value field crops—depressing the state’s agriculture GDP calculation.

Additionally, Texas boasts the largest livestock industry in the U.S., which accounts for a disproportionate share of the state’s agricultural sector. Maintaining breeding herds is a big component of Texas agriculture but is not fully reflected in GDP estimates because these assets aren’t regularly sold.

—Emily Kerr

The Permian Basin, home to many of America's oldest oil fields, covers 75,000 square miles of West Texas and southeastern New Mexico. Discovered in 1921, the formation has produced more than 40 billion barrels of oil, including much of the oil used during World War II. Until recently, the Permian Basin's biggest challenges were to slow the loss of production—which began ebbing in 1973—while squeezing out the last 30 billion barrels of “mobile” oil as economically as possible. That was before innovation, technology and \$100-per-barrel oil offered the aging fields a new future.

The breakthrough arose in the Midland area's Spraberry oil field, among the Permian Basin's most venerable locations. Spraberry formations were fractured for decades, usually in one or two zones, for vertical wells. The innovation: drilling vertically while emulating the multistage fracturing typical of horizontal wells. The lateral section of a horizontal well can be drilled at 4,000–8,000 feet, with many stages of fracturing along the way. Spraberry wells were drilled vertically, but by going deeper, the number of oil- or gas-producing zones increased. By fracturing each producing zone—perhaps a dozen of them—the

wellbore increasingly came to look like the lateral section of a horizontal well. The result spawned a boom in the eastern Permian Basin in 2005, reversing years of decline.

The Permian Basin's second chance at new life parallels earlier development of the Eagle Ford in South Texas (*see related article, page 3*). Horizontal drilling and fracturing could produce oil from shale—and the western Permian Basin is rich in shale—instead of concentrating only on the remaining 30 billion barrels of mobile oil.

The Delaware Subbasin encompasses the Hobbs area of southeastern New Mexico and four counties of West Texas and is home to the Avalon and Wolfcamp shale, as well as three layers of Bone Spring shale. Together, they provide rich targets of oil and natural gas liquids.

Shale development is just beginning in the Delaware. A Texas General Land Office lease auction in April 2011 brought a bid of \$3,264 per acre for 30,000 acres (\$9.8 billion in total), compared with an average bid of \$906 per acre six months earlier. Drawing on the Eagle Ford model, the Delaware offered shale rich in liquids, plus well-developed infrastructure and

skilled labor, heralding a major transition.

Partly because these developments are relatively new, production data don't yet reflect the magnitude of the changes. Oil production in the Delaware during 2011 was 13 million barrels above that in 2008 (when the price peaked), while natural gas production declined significantly. Revenue from oil and gas production increased \$1 billion from 2008 to 2011.

As production has grown in the Eagle Ford and Bakken oil shale regions, a shortage of infrastructure to transport the product to market has been a key constraint. Moving new natural gas liquids to the 1-million-barrel-per-day market on the Gulf Coast has posed the greatest problems. The mature Permian Basin, with a rich infrastructure in place, enjoys the advantage of expanding on existing transportation systems rather than starting from scratch. And significant expansions are under way, with new gathering systems and fractionation capacity in the Avalon shale. Additionally, a rail terminal and several pipelines are under construction to move product to Houston.

The stories of the Permian Basin's tight labor markets are the stuff of legend—restaurants half-open for lack of workers, the local fast food place importing wait staff from eastern Europe. Labor markets in the Delaware were tight before the shift to shale began, and they remain so. A 15 percent increase in total wages last year was driven by a 6.2 percent jump in employment, accompanied by an 8.8 percent increase in wages paid per worker (*Chart 1*). Labor shortages in the lucrative oil sector drive local wage increases, leaving other segments to compete for workers.

And that nearly frenetic activity level is increasing. Drilling in dry gas-producing areas such as the Barnett and Haynesville shale regions significantly pulled back following the collapse of natural gas prices to nearly \$2 per thousand cubic feet during the winter. Producers and service companies are rapidly shifting rigs and hydraulic fracturing crews into shales rich in oil and natural gas liquids. Thus, while overall drilling activity has cooled in recent months, the Permian Basin has picked up the pace.

—Robert W. Gilmer and Jesse B. Thompson III

**Chart 1**  
**Total Wages Rise as Shale Extraction Moves to Permian Basin**  
(Annual growth of wages in the Delaware Subbasin)



SOURCE: Quarterly Census of Employment and Wages, Bureau of Labor Statistics.

# Self-Employment an Option for Workers Who Lose Jobs in Economic Slowdowns

By Anil Kumar and Michael Weiss

*Because of the significance of self-employment, understanding its relationship to the business cycle is especially useful during periods of financial stress.*

The American worker has been buffeted in recent years, first during the Great Recession and again during the weak recovery that followed. The Federal Reserve has contemplated further monetary measures to support hiring as the jobless rate settles in the low-to-mid 8 percent range nationally, down from a seasonally adjusted 10.1 percent peak in September 2009.

Displaced individuals who are unable to find a new employer may opt to seek unemployment benefits or leave the labor force. But often they choose a different path: self-employment. The self-employed can form an incorporated entity—doctors, lawyers and other professionals often do so for legal and tax considerations, in essence working for the business they created.

Alternatively, they can start unincorporated businesses, working for themselves in such disparate professions as laborer, business analyst, writer and performer.<sup>1</sup>

The transition from employee to self-employment provides an informative economic indicator. Changes in a state's unincorporated self-employment rate during the U.S. recession, for example, appear positively correlated with the severity of the downturn as reflected in state unemployment-rate changes—a relationship captured in the upward-sloping line in Chart 1.<sup>2</sup>

## Recessions and Self-Employment

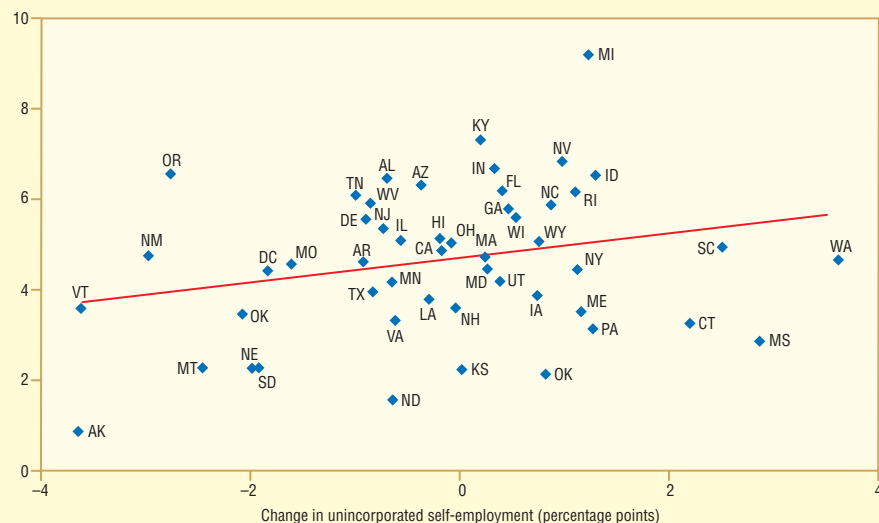
About one in 10 U.S. workers was self-employed during 2011. Within the group, 60 percent were in unincorporated endeavors. It is widely believed that small and relatively new firms, many of which are established by the self-employed, account for the bulk of new jobs created in the economy.<sup>3</sup> Because of the significance of self-employment, understanding its relationship to the business cycle is especially useful during periods of financial stress, when even the largest businesses turn cautious in hiring and retention.

Although recent research shows a positive relationship between local unemployment rates and the transition into self-employment, the overall impact of recessions on unincorporated self-employment is far from clear.<sup>4</sup> Self-employment can rise or fall.

Theoretically, workers choose to invest part of their personal wealth and become self-employed if potential returns from their own business exceed the sum of likely earnings from a job and investing their assets elsewhere. Potential new entrants to self-employment often find it difficult to raise required capital during tough times, when personal wealth is frequently diminished as asset prices fall. Those seeking to borrow may encounter

**Chart 1**  
**Self-Employment Correlates Positively with Severity of Great Recession**

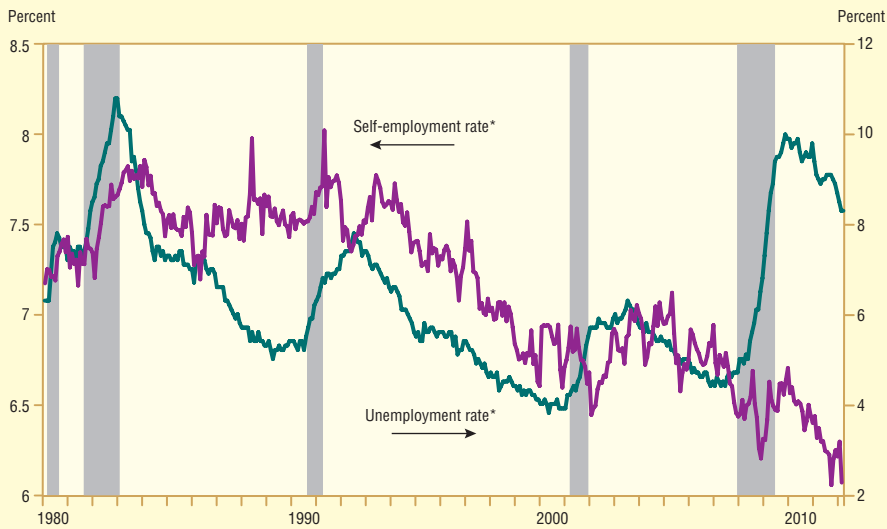
Change in unemployment rate (percentage points)



NOTE: The National Bureau of Economic Research dates the most recent recession as December 2007 to June 2009.  
SOURCES: Bureau of Labor Statistics; Haver Analytics; authors' calculations.



**Chart 2**  
**Self-Employment–Unemployment Relationship Weakens in Last Two Slumps**



\* Seasonally adjusted.  
 NOTE: Shaded areas indicate recessions.  
 SOURCES: Bureau of Labor Statistics; Haver Analytics.

*In times of uncertainty, established businesses ambivalent about long-term economic prospects may be hesitant to hire permanent workers. They may, instead, make a hedged bet on an upturn by temporarily hiring the self-employed.*

banks that do not want to lend. Individuals already self-employed struggle with the same conditions afflicting the broader economy, including difficulty achieving profitability because of declining aggregate demand.

Even so, a sizable number of individuals confronting joblessness may turn to self-employment when facing the prospects of a difficult job search, reduced job hours or lower potential earnings. During a downturn, the cost of starting a business typically declines due to lower labor costs (including forgone wages) and other expenses.

The unincorporated self-employment rate rose in three of the previous five downturns (*Chart 2*). While self-employment was strongly countercyclical—increasing in 1980, 1982 and 1991—it declined in 2001. During the Great Recession, self-employment fluctuated, with an initial increase, followed by a sharp drop amid unprecedented turmoil in the financial markets. Self-employment strongly rebounded when the Federal Reserve’s monetary stimulus measures to ease financial stress took hold (*Chart 3*). As the economy recovered, the self-employment rate returned to near prerecession levels.

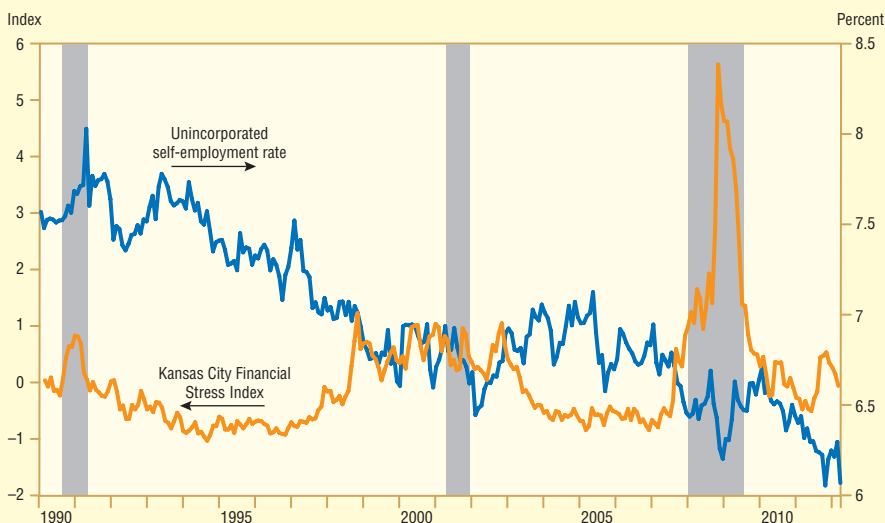
Demand for self-employed workers may be countercyclical—another reason self-employment may vary across the business cycle. For example, in times of uncertainty, established businesses ambivalent about long-term economic prospects may be hesitant to hire permanent workers. They may, instead, make

a hedged bet on an upturn by temporarily hiring the self-employed.<sup>5</sup>

### Gauging Labor Market Impact

An increase in self-employment has clear economic benefits, damping unemployment and aiding job growth through entrepreneurial activity. The implications for labor market slack are somewhat less

**Chart 3**  
**Self-Employment Correlates with Financial Stress Index**



NOTE: Shaded areas indicate recessions.  
 SOURCES: Bureau of Labor Statistics; Haver Analytics; Federal Reserve Bank of Kansas City.

## What Makes Texas Different?

Texas has consistently recorded a higher annual average unincorporated self-employment rate relative to the nation—a difference that persists even when accounting for demographic characteristics such as age, sex, race and education (*Chart A*). The Texas workforce has more men, fewer people who are college educated and more people who are foreign born, all pointing to a higher self-employment rate. Texas' long international frontier also contributes to higher self-employment. Mexican immigrants along the border are significantly more likely to be self-employed than those inland.<sup>1</sup>

Alternatively, Texas' younger and less-white population predicts a lower self-employment rate.

The state's industrial structure also significantly influences the broader trend, with its relatively larger construction sector encouraging higher unincorporated self-employment rates while its smaller manufacturing sector suggests less-prevalent self-employment.

On net, however, differences in demographics and industrial structure predict a slightly lower self-employment rate for Texas, not higher. The fact that the state's unincorporated self-employment rate is higher suggests that other factors—such as a favorable regulatory and business climate—likely play an expanded role in explaining the state's unincorporated higher self-employment rate.

By contrast, the state lags behind the nation in incorporated self-employment (*Chart B*). Texas' lower incorporated self-employment is partly explained by differences in race, age and educational attainment. However, variations in demographics and industrial structure explain no more than half of that difference.<sup>2</sup>

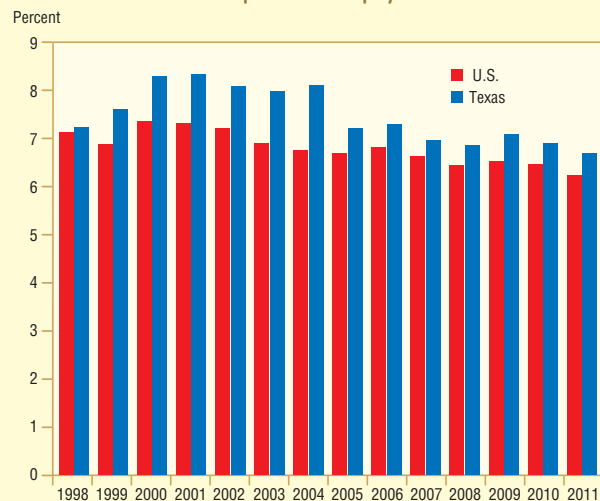
### Notes

<sup>1</sup> See "Mexican Immigrant Self-Employment Along the U.S.-Mexico Border: An Analysis of 2000 Census Data," by Marie T. Mora and Alberto Dávila, *Social Science Quarterly*, vol. 87, no. 1, 2006, pp. 91–109.

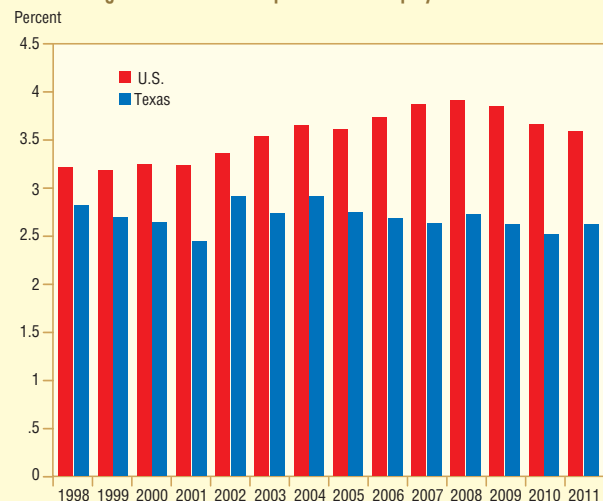
<sup>2</sup> Analysis of the sources of the difference between self-employment rates in Texas and the U.S. is carried out using Oaxaca decomposition.

### Self-Employment Trends in Texas Differ by Type of Entity

A. Texas Leads U.S. in Unincorporated Self-Employment . . .



B. . . . But Lags the Nation in Incorporated Self-Employment



SOURCES: Bureau of Labor Statistics' Current Population Survey; authors' calculations.

upbeat if the self-employed struggle to find buyers for their products or services.

The unincorporated self-employed face greater labor market stress than the average worker; they have a higher incidence of part-time employment for economic reasons and lower average weekly hours, according to Bureau of Labor Statistics data from its Current Population Survey (CPS). Structural differences among states affect the prospects of individuals who go it alone. For example, the regulatory and business climate in Texas makes unincorporated self-employment more inviting than

might be expected given its demographics and industrial structure (*see the box "What Makes Texas Different?"*).

Demographic characteristics and behaviors of the self-employed also factor into labor market impact.

Although the unincorporated self-employed are classified among the employed, they differ from wage and salary personnel. At an average age of 48 years in 2011, these self-employed tend to be six years older than other workers. This reflects two factors likely contributing to greater self-employment among longstanding workforce participants.

First, older workers have more work experience, greater wealth and access to credit. Thus, it is not surprising that 15 percent of workers 65 and older were self-employed in 2011—more than twice the rate for workers 35 to 55.

Also, older workers confronting personal or financial imperatives are increasingly unwilling to retire. Baby boomers, whose anticipated retirement income increasingly shifted to defined contribution plans such as 401(k)s from traditional annuity-like defined benefit programs, appear particularly compelled to remain working. Retirement

assets, which become a backup source of support during prolonged unemployment, are often diminished. Additionally, the lump-sum 401(k) distribution provided immediately upon leaving an employer becomes an attractive funding source for starting self-employment.<sup>6</sup> Among the employed 55-to-64 demographic, 22 percent were self-employed in 2011, up from 15 percent in 2000, CPS data show.

At the same time, self-employment decreases with education. The unincorporated self-employment rate among college degree holders is 6 percent—2 percentage points lower than for those without a high school diploma. Given the ability of the highly educated self-employed to raise capital, many choose to incorporate their businesses.

Moreover, males are more likely to be self-employed than females, and whites have a higher self-employment rate than other racial groups.

Many of the differences among demographic groups can be explained by workforce characteristics such as occupational category and industry—construction workers, for example, are much more likely to be self-employed than those in manufacturing.

## Rethinking Programs

Should heightened self-employment—particularly among older workers—become an enduring feature of the postrecession economy, programs based on traditional employer–employee relationships will remain relevant but may need to be redrawn to accommodate the new realities that are emerging.<sup>7</sup>

*Kumar is a senior research economist and advisor and Weiss is the economic writer/editor in the Research Department at the Federal Reserve Bank of Dallas.*

## Notes

<sup>1</sup> Internal Revenue Service (IRS) tax-return data provide an alternative to the Current Population Survey for measuring self-employment. The IRS defines unincorporated self-employed workers as those who carry on a trade or business as sole proprietor/independent contractor/member of a partnership or who are in business for themselves (including a part-time business).

<sup>2</sup> The unemployment rate change is an imperfect measure of recession severity because it is a lagging indicator of recessions. Recession severity accounts for a recession's depth as well as duration and, in the most recent downturn, is measured as the absolute sum of changes in the unemployment rate from December 2007 to June 2009. This

is similar in spirit to “Real-Time Macroeconomic Monitoring: Real Activity, Inflation and Interactions,” by S. Borağan Aruoba and Francis X. Diebold, *American Economic Review*, vol. 100, no. 2, 2010, pp. 20–24.

<sup>3</sup> For example, see “Who Creates Jobs? Small vs. Large vs. Young,” by John C. Haltiwanger, Ron S. Jarmin and Javier Miranda, National Bureau of Economic Research, NBER Working Paper no. 16300, August 2010, and “Do Small Businesses Create More Jobs? New Evidence for the United States from the National Establishment Time Series,” by David Neumark, Brandon Wall and Junfu Zhang, *The Review of Economics and Statistics*, vol. 93, no. 1, 2011, pp. 16–29.

<sup>4</sup> From “Entrepreneurship, Economic Conditions and the Great Recession,” by Robert Fairlie, *Journal of Economics and Management Strategy*, forthcoming.

<sup>5</sup> See “Assessing the Jobless Recovery,” by Daniel Aaronson, Ellen R. Rissman and Daniel G. Sullivan, Federal Reserve Bank of Chicago *Economic Perspectives*, Second Quarter 2004.

<sup>6</sup> See *Self-Employment Among Older Workers: Assistance Programs, Liquidity Constraints and Employment Patterns*, by Qian Gu, Santa Monica, Calif.: RAND Corp., 2009.

<sup>7</sup> See *An Economy that Works: Job Creation and America's Future*, by James Manyika, Susan Lund, Byron Auguste, Lenny Mendonca, Tim Welsh and Sreenivas Ramaswamy, New York: McKinsey Global Institute, June 2011.

*Should heightened self-employment—particularly among older workers—become an enduring feature of the postrecession economy, programs based on traditional employer–employee relationships will remain relevant but may need to be redrawn to accommodate the new realities that are emerging.*

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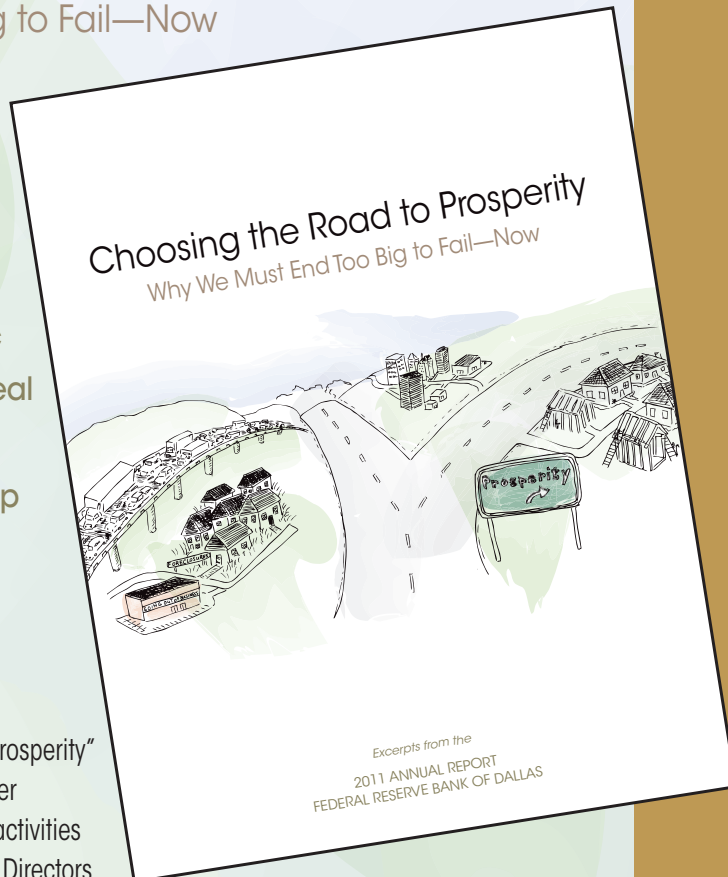
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