

# Southwest Economy



## Determining Creditworthiness and Texas' Case for a Top Rating

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▶ *As our elected officials struggle to reboot economic competitiveness without encumbering future generations with debt, perhaps they should look to the economic laboratory that is Texas.*

Texas has a long tradition of outperforming the nation in job creation—a trait that is matched only by our long-standing reputation for modesty. Over the past two decades, the state has added jobs at more than double the pace of the U.S. This year, employment growth is above 3 percent, compared with less than 1.5 percent for the nation.

Texas' fiscal position is also strong relative to the U.S., as Jason Saving notes in this issue of *Southwest Economy*. The state falls just short of a consensus top bond rating from the three major credit ratings agencies. The evaluation is based on the state's outstanding performance in many areas of the economy.

In a reflection of our strong economy, the state continues to attract significant numbers of new residents. Net domestic in-migration averaged more than 80,000 annually in Texas from 1991 to 2011, in contrast with *outmigration* of 192,000 from California and 187,000 from New York. People come here for opportunity.

To be sure, employment growth should not be the only criterion for evaluating a state's performance, and as Saving makes clear, Texas is not without its challenges. It's important that we remember, however, that economic growth is the foundation for the other goals and aspirations of a society.

Neither Texas nor the U.S. can pay for social services, education or infrastructure without the tax revenue to do so. And there is no tax revenue without sources from which to collect it. The best source of revenue is a citizenry that is gainfully employed and an economy that is growing and prosperous.

Managing the tradeoffs between fiscal responsibility and social and environmental stewardship is perhaps the greatest challenge our nation confronts. It's important to remember that, as President Dwight D. Eisenhower said in his farewell address, "We cannot mortgage the material assets of our grandchildren without risking the loss also of their political and spiritual heritage. We want democracy to survive for all generations to come."

If you believe people vote with their feet, the balance our state has struck between economic dynamism and government services seems appropriate enough to attract a diaspora from other states. As our elected officials in Washington struggle to reboot economic competitiveness without encumbering future generations with debt, perhaps they should look to the economic laboratory that is Texas.

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

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



# Determining Creditworthiness and Texas' Case for a Top Rating

By Jason Saving

▶ *To the ratings agencies, the AAA-rated states share one important trait: fiscal capacity, a superior ability to raise revenue within their borders to cover fiscal obligations.*

**J**ust as individual consumers' credit scores determine the availability and cost of borrowed funds, states' credit ratings assess their presumed ability to repay bond investors often decades into the future.

Eight states carry the highest, AAA bond grade from the country's three major credit ratings agencies. The "elite eight" are Delaware, Georgia, Iowa, Maryland, Missouri, North Carolina, Utah and Virginia. Texas narrowly misses inclusion, with a top rating from two of the three agencies.<sup>1</sup>

The significance of credit ratings has been underscored in recent public debate regarding the rising federal debt and one firm's decision to withdraw its AAA assessment of the United States. The rating is important because top marks generally allow governments to borrow money at lower interest rates, thereby enabling their residents to spend less money servicing public debt. States issue debt for a wide variety of reasons, including the construction and maintenance of roads, bridges and schools and even day-to-day liquidity needs.

The eight states are an outwardly varied group. They aren't clustered in a particular region, benefiting from a vibrant geographic location, nor do they have similar industrial compositions. Demographically, they're also dissimilar. Utah is among the youngest and least diverse states, while Iowa is older and Georgia and Maryland are relatively more diverse.

To the ratings agencies, AAA-rated states share one important trait: fiscal capacity, a superior ability to raise revenue within their borders to cover fiscal obligations. This doesn't, in and of itself, guarantee that those states will meet their commitments. It does, however, signal that they are well-positioned to do so absent significant,

unexpected economic or political developments.

Texas' credit rating is just below a consensus AAA but better than the national average. The state has advantages that include rapidly growing industries and extensive in-migration by people seeking better economic opportunity. It consistently ranks high among states with the best business climates. In addition, employment has grown about 1 percentage point faster in Texas than the nation—and faster than in each of the eight states with top credit ratings.

Texas' standing begs the question: What factors help determine fiscal capacity and a state's underlying ability to repay bondholders in a timely fashion, through good times and bad?

Industrial diversification, type of tax system, "rainy day" savings, population growth, business opportunity and employment levels all matter, as does investment in education and social services.

## A Measurement of Risk

Simply put, a state's credit rating measures how much risk is associated with any given bond issuance. The better the rating, the better the terms on which credit will be provided.

The three major credit-rating issuers in the United States are Moody's Investors Service, Fitch Ratings and Standard & Poor's. Potential bond issuers are rated on a scale that ranges from AAA/Aaa for top-quality borrowers to B3/B- for borrowers whose paper carries a fair amount of risk (*Table 1*).<sup>2</sup> The ratings firms don't always agree—for example, Texas holds a AAA/Aaa rating from Fitch and Moody's but an AA+ from S&P. Generally, the ratings are similar because each company uses some of the same data to assess essentially the same proposition—the underlying risk associated with loaning money.

When a state's fiscal capacity is

**Table 1** Agencies' Credit Ratings and What They Mean

Moody's	S&P	Fitch	Quality level
Aaa	AAA	AAA	Prime
Aa1	AA+	AA+	High grade
Aa2	AA	AA	
Aa3	AA-	AA-	
A1	A+	A+	Upper medium grade
A2	A	A	
A3	A-	A-	
Baa1	BB+	BB+	Lower medium grade
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
Ba1	BB+	BB+	Noninvestment grade/speculative
Ba2	BB	BB	
Ba3	BB-	BB-	
B1	B+	B+	Highly speculative
B2	B	B	
B3	B-	B-	

high, it has the means to raise adequate revenue for new spending programs without compromising existing obligations. Most importantly, a superior fiscal capacity helps reassure investors that a state can make full and timely repayment of interest on its bonds.<sup>3</sup> When a state's fiscal capacity is low, it cannot easily raise revenue to meet new obligations and may face greater skepticism from investors, who demand higher interest rates on the state's debt to compensate for the greater perceived risk.

### Evaluating Creditworthiness

Among the most relevant factors determining creditworthiness is the overall configuration of a state's economy. Decades ago, Texas largely centered on "cotton, cattle and oil" at a time when the Midwest and Northeast were diversifying into a more modern economic environment. When an economy is heavily dependent on one particular sector, its sudden downturn—which occurs periodically—can dramatically worsen state fiscal health, imperiling timely repayment of obligations. In contrast, diversification helps minimize the fiscal impact of sectoral downturns, much as individual investors incur less risk with a mutual fund than a specific stock.

The Texas economy has grown more similar to the well-diversified national economy. Chart 1 plots the degree to which some of the largest states mirror the national employment profile;

complete resemblance equals 1. The trend was interrupted during the energy booms of the early 1980s and today, which temporarily boosted the size of the energy sector and made the state economy somewhat less diversified than it would otherwise be. On the other hand, energy booms also swell state coffers and create significant disposable income for Texas residents, helping offset the mild increase in credit risk that would ordinarily be associated with a temporary diversification diminution.

Of course, diversification does not entirely eliminate risk. Recent events have shown that when large parts of the overall economy falter simultaneously, even a well-diversified "portfolio" of industries cannot fully overcome fiscal pressures, leading many states to cut spending, raise taxes and borrow more. Still, a diverse mix to some degree guards against this and helps a state meet its obligations even during difficult economic times.

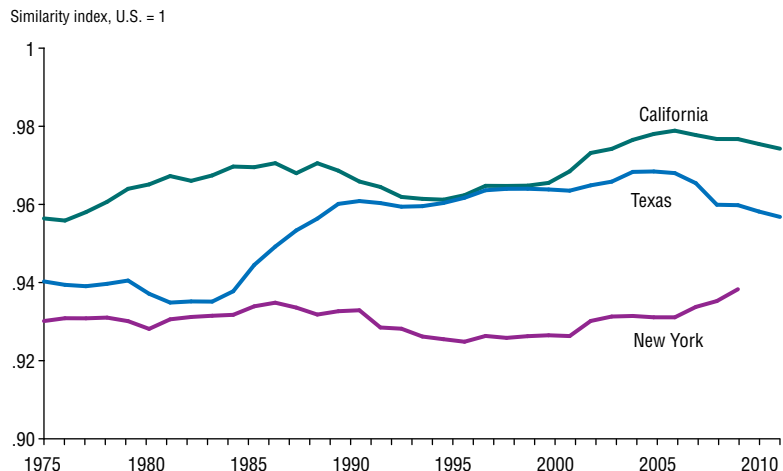
State tax systems can significantly shield government treasuries from the stresses of the overall business cycle—or amplify those stresses. Individual incomes typically rise faster than consumption during economic expansions as people find themselves better able to find jobs and obtain raises. They also fall faster than consumption during

recessions as people seek to maintain a reasonable standard of living even as layoffs rise and job opportunities fall away. Thus, states heavily dependent on income taxes are more likely to ride the business cycle than other states, reaping outsized revenue gains during good times but suffering sizable revenue contractions during recessions. Conversely, states that primarily tax consumption won't receive windfalls during economic booms but will experience more stable revenue over time, offering hope to creditors that their debt-repayment promises are more likely to be respected even if an unanticipated downturn occurs.

Here, too, the Texas economy compares relatively favorably with its big-state peers (Chart 2). For instance, California's reliance on procyclical taxes such as an unusually progressive income tax ensures its revenue swings strongly with the business cycle, growing relatively rapidly in the boom years of 2003–06 but falling steeply during the 2007–09 period. Texas revenue remained more stable during both the boom and the bust as sales (consumption) taxation caused it to miss out on the early-decade income boom but also on the late-decade bust.

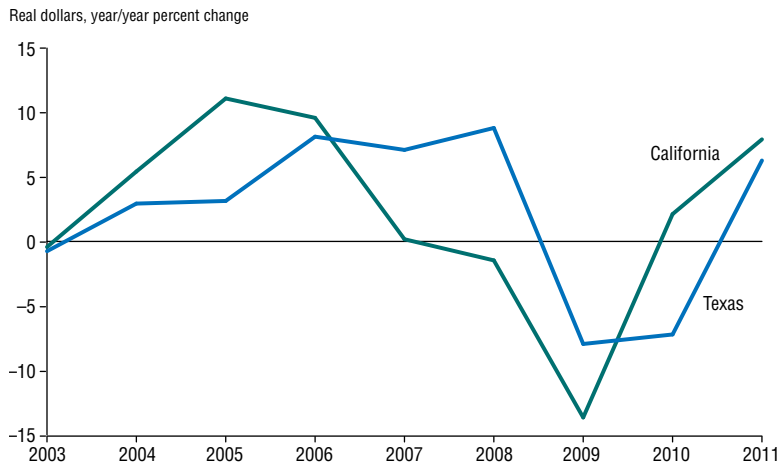
Another means by which a state can insulate itself during difficult times is an economic stabilization fund (ESF), better known as a rainy-day fund.

**Chart 1** Texas' Economic Diversity Rises Over the Years



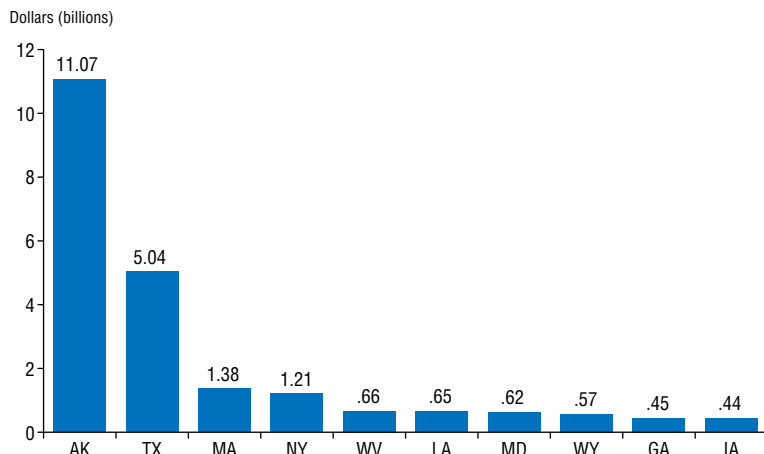
NOTE: The index measures the similarity of a state's industry mix with the nation's—a reading of 1 indicates the state has the same share of jobs in each industry sector as the nation, while 0 suggests that its mix differs to an extreme.  
SOURCE: Bureau of Labor Statistics.

**Chart 2** Tax Revenue Growth More Stable in Texas than California



SOURCES: Census Bureau; Bureau of Labor Statistics.

**Chart 3** Alaska and Texas Have Highest Rainy-Day Fund Balances



NOTE: Data from 2011.

SOURCE: National Association of State Budget Officers.

During ordinary times, the fund receives a portion of annual state revenue, sometimes from specific taxes earmarked for this purpose. When unforeseen fiscal pressures emerge—often because a state has entered recession and revenue unexpectedly lags behind projections—the state can draw from the fund until the situation improves. In essence, the ESF acts as a silo in which a state can store money in anticipation of adverse economic shocks down the road.

Thirty-eight states have rainy-day funds, but most of the sums are quite small. Preparing for an unforeseen

downturn often takes a backseat—for individuals and states—because it reduces available funds in the near term for other priorities that may at the time seem more pressing. Only two states, Alaska and Texas, have maintained rainy-day fund balances exceeding \$2 billion over the last decade, in part because of unexpectedly strong energy production revenue (Chart 3). Texas' rainy day fund is expected to reach at least \$8 billion by next August (the end of fiscal 2013), putting it in a relatively strong position to weather a future recession.

A state's likelihood to grow faster

than its peers is an additional factor determining future creditworthiness. States offering more favorable business climates and better availability of land tend to grow relatively quickly, making them a better bet for stronger economic growth down the road. And as a state grows faster, it increases its fiscal capacity to repay debt without compromising other policy goals.

Texas employment has over the last several decades grown about 1 percentage point per year faster than the U.S. as a whole (Chart 4). The reasons include a low cost of living, ready labor availability, low corporate taxes and an education system that—while not among the nation's strongest—is sturdier than its southern neighbors.<sup>4</sup> Absent a change in one or more of these factors, this general trend is expected to continue.

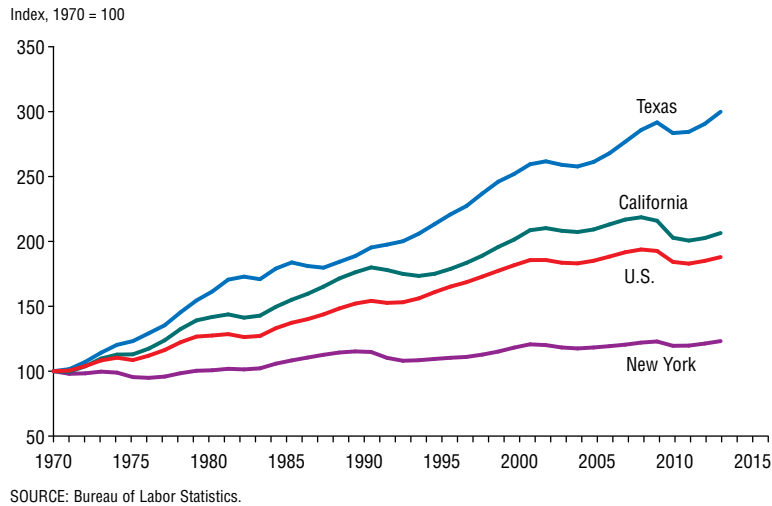
Moreover, independent assessments of the state business climates almost invariably rank Texas as among the nation's most hospitable (Chart 5). These ratings analyze factors such as the regulatory climate, access to capital, cost of living and labor availability to produce a comprehensive assessment of the extent to which a state is "open for business." Taken together, these factors suggest Texas is likely to outperform its peers in the near future.

### Future Challenges

Education is among several factors that could potentially pare Texas' future fiscal capacity. The state has gradually reduced the role of local property taxes, a relatively stable revenue source dedicated primarily to schools, in favor of general-revenue funding by the state. This has been met with increasing legal pressure on Texas to increase aggregate funding for education. While a better education system would be almost universally welcomed, new general-revenue spending attenuates the state's fiscal capacity. Of course, a better-funded education system might improve productivity and thereby put Texas on a stronger economic growth path. If this were the end result, more education funding would eventually increase fiscal capacity and make Texas a better credit risk.

Social services spending, notably on

**Chart 4** | Texas Outperforms Other Big States, Nation in Employment



Medicaid, poses another challenge for Texas (and many other states). Payments for Medicaid, the shared federal-state program that funds medical services to the poor, were once relatively steady in Texas but have grown rapidly in recent years with no clear sign of leveling out. If Medicaid continues to increase as a share of the state's overall budget, funding for other programs will have to be cut or taxes will have to rise.

These examples illustrate the limitations of fiscal capacity as it relates to credit ratings. While fiscal capacity

plays an important role in their determination, *willingness* to meet fiscal obligations is also important. While a state that has no further resources to tap cannot meet new fiscal obligations no matter how fervently it might wish to do so, it also may choose not to fund the obligations even if it can.

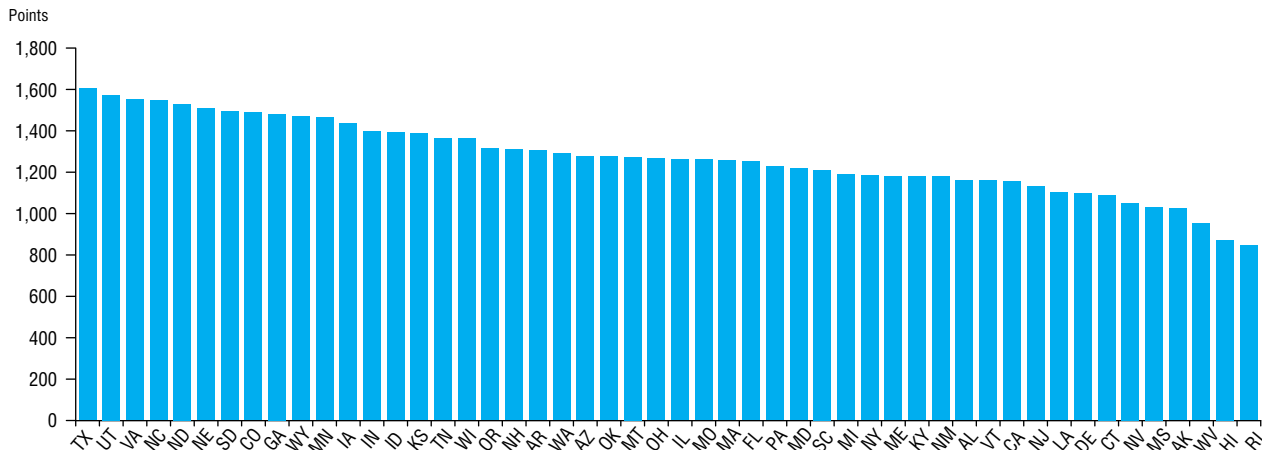
One area where this comes into play is state pension systems, whose promised benefits generally exceed policymakers' willingness to save on their behalf. Pension obligations are perhaps the largest single liability confronting

states, and a significant number of states have failed to fund them at the 80 percent threshold generally recommended by pension analysts. Like any private pension system, a state that saves too little for its retirees during their working years will find itself strapped for cash as retirements occur, especially when accompanied by declining population growth and increasing life expectancy.

While this day of reckoning may not occur for a while, forward-looking investors will on average demand more of a premium to purchase bonds from states whose fiscal capacities will predictably decline over time. Conversely, they will demand less from states that have maintained an 80 percent-or-better funding ratio and can more readily pay the remainder from general revenue without overly straining their fiscal capacities. Texas exceeds that threshold (Chart 6), with enough set aside to cover 82 percent of pension liabilities. But that still leaves a sizable gap for which additional appropriations could pressure general revenue down the road.

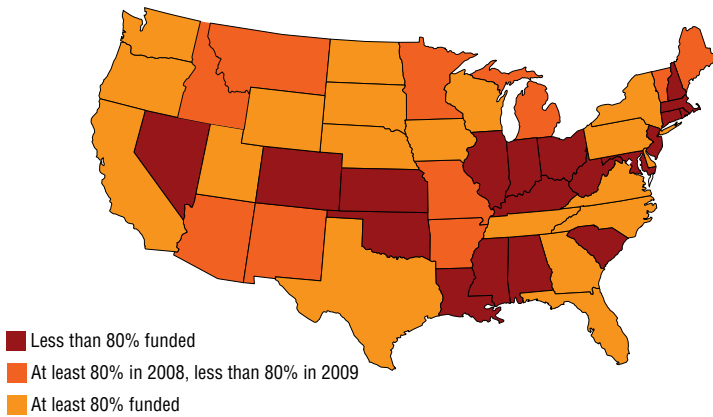
Another area where this willingness comes into play is overall revenue and expenditure levels. States such as Texas have historically opted for a relatively low level of per capita spending (Chart 7), with most going to the core state government functions of education, criminal justice, infrastructure and health.

**Chart 5** | Texas Ranks Highest for Business Climate in 2012



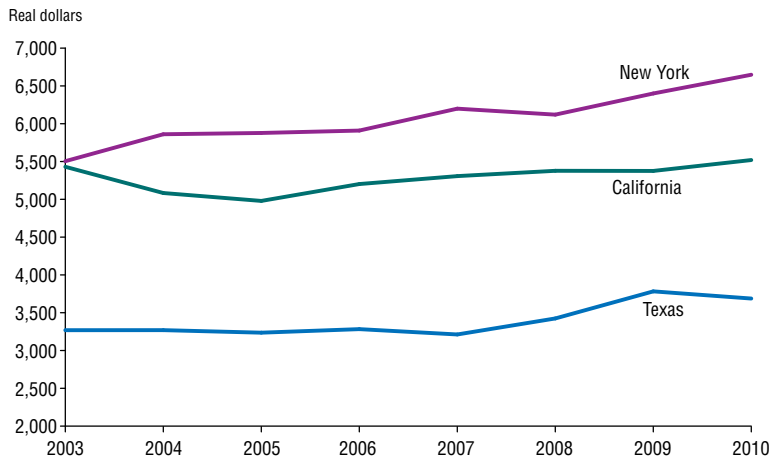
NOTES: CNBC assigns points over a range of factors that include cost of doing business and access to capital. Other organizations publish business-climate lists that use different sets of measures. SOURCE: CNBC.

**Chart 6** Texas Pension Funding Exceeds Recommended 80 Percent in 2008–09



SOURCE: Pew Center on the States

**Chart 7** Texas on Low End of Per Capita State Spending



SOURCES: National Association of State Budget Officers; Bureau of Labor Statistics; Census Bureau.

This stance has been cited as a major reason Texas has grown faster than the nation. This has enabled the state to keep taxes low, fostering a business-friendly climate, but it also precludes some options that other states might pursue to more easily meet their fiscal obligations. Illinois, for example, recently improved its fiscal capacity by raising some fees and taxes, although its large and growing pension liabilities continue to influence its credit ratings.

It's also important to note that Texas emphasizes the importance of debt vis-à-vis other areas of the budget.

The Texas constitution prioritizes state debt repayment above ordinary discretionary spending, which helps ensure spending reductions necessary over the course of the business cycle will not affect bondholders (and, therefore, the state's credit rating).

### Texas in Perspective

Texas has one of the nation's higher credit ratings, reflecting its relatively diversified economy, comparatively stable tax system, large rainy-day fund and consistently strong growth rate.<sup>5</sup> Its pension system—a key obligation—is

fairly well funded and offers constitutional protections to bondholders that interest payments will occur in a full and timely fashion. The state also offers a favorable business climate and is among the biggest destinations for migrants in the country, both of which strengthen the state's fiscal capacity. Yet, Texas also faces challenges involving education and Medicaid that, depending on how they are handled, could diminish that capacity down the road.

While noneconomic factors play a role in a state's individual circumstances, ratings are heavily influenced by each state's policy environment and how well that environment responds to the economic shocks with which states (or other entities) are regularly confronted. Decisions made by lawmakers and other officials can position a state to rise to a better credit rating—or fall to a lower one.

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### Notes

- <sup>1</sup> Ratings agencies base their evaluations on different sets of criteria, and this can cause ratings to vary.
- <sup>2</sup> Below these are C-rated "junk" bonds that carry a significantly greater risk of default.
- <sup>3</sup> The same is true at the national level.
- <sup>4</sup> Scores from the National Assessment of Education Progress rank Texas 34th out of 50 states. Arkansas placed 41st, Oklahoma 46th, Louisiana 47th and New Mexico 48th.
- <sup>5</sup> Reflecting the state's greater diversification, oil and natural gas production taxes were the No. 6 and No. 7 sources of revenue in 2011, collectively accounting for just under 7 percent of total state revenue. That is a bigger share of revenue than a few years ago but still not large enough to have much of an impact on Texas' overall creditworthiness.

*A Conversation with Michael Plante*

## Increased U.S. Energy Supply Helps Offset Tight Global Conditions

*As world crude oil prices remain persistently elevated, along with those for many other commodities, Dallas Fed research economist Michael Plante explores the reasons why and the prospects for lower costs, including those at the pump. He offers a cautionary note about U.S. advances toward energy independence and the era of inexpensive natural gas.*

### **Q. Amid disappointing U.S. economic growth, the European recession and slowing in emerging markets, oil prices seem high. Why? What's the outlook for 2013?**

Although economic growth in many industrialized countries has been lackluster in recent years, the world economy has grown and global oil consumption has slowly, but surely increased. The world consumed about 1 percent more oil in 2011 than in 2010, and demand is expected to expand by just less than 1 percent this year.

Meanwhile, supply has struggled to keep pace with demand. Unexpected supply disruptions are partly to blame. Libya went offline in 2011 during its revolution, and in 2012, there have been problems in Syria, South Sudan and the North Sea. Moreover, apart from Canada and the U.S., non-OPEC output growth has been poor.

World supply in 2011 rose just 0.3 percent from 2010 levels, an increase insufficient to keep up with demand. The situation improved this year, with supply climbing more than 2 percent. That has been just enough to keep pace with demand growth. So, upward pressure on oil prices hasn't been surprising. Crude oil averaged \$80 per barrel in 2010, \$111 in 2011 and is expected to average \$112 this year.

The world economy is likely to continue growing at a subdued pace next year, as is demand for oil. The Energy

Information Administration (EIA) is currently penciling in about a 1 percent consumption increase for 2013. Supply is expected to expand by about 1.1 percent, and this should help ease pressure in the market. The EIA predicts Brent crude oil prices will average about \$103 a barrel, a modest decline from 2012.

### **Q. Prices for other commodities, such as corn and soybeans, are near record highs too. Is there anything they share with oil markets?**

These commodities and crude oil have all benefitted from burgeoning demand over the past decade or so. Much of it reflects economic growth in the developing world, especially China. For example, China's soybean consumption roughly tripled from 2000 to the present and now accounts for about 30 percent of world consumption, up from 15 percent in 2000. If you look at the data for corn, China consumes almost 70 percent more than it did in 2000. The country, which had been a corn exporter, became a net importer in 2009. Meanwhile, China's crude oil consumption has doubled since 2000.

As with oil, rapid growth in demand for other commodities has created a situation where any supply problems prompt rapid price increases; for example, poor U.S. harvests in 2010 and 2012 caused corn and soybean prices to spike.

### **Q. There are different types of oil, and they command different prices. It used to be that the price of West Texas Intermediate (WTI) and North Sea Brent crude were roughly in line. Why isn't that true anymore?**

Crude oil varies from place to place and thus sells for different prices. Brent and WTI, both light sweet crude, should sell for roughly the same amount. Since early 2011, however, WTI has been much cheaper than Brent crude. WTI has sold for about \$20 less than Brent crude in recent months.

This reflects a crude-oil production boom in Canada, North Dakota and parts of Texas that has flooded the Midwest and midcontinent markets. This has led to a bottleneck in Cushing, Okla., a key distribution hub. Crude oil is usually shipped by pipeline, but there is just not enough capacity to move it to other parts of the U.S. or Canada where it could fetch higher prices.

Given the price disparity and the lack of pipelines, people have shipped crude by truck, rail and barge to get it to areas where it will sell for higher prices. Refineries in the Midwest and the Rocky Mountain regions have taken advantage of the disparity by running at full capacity. These refiners can sell gasoline at world prices but pay significantly lower input costs than competitors elsewhere.

Pipelines are eventually going to be built that will deal with this situation. Once that happens, Brent and WTI prices will converge.

### **Q. You note that U.S. oil production has increased after many years of decline. Have oil imports declined as a result? Is North American energy independence a realistic and desirable goal?**

New technology has led to surging U.S. production since 2009, reversing a decline that began in the mid-1980s. As a result, crude oil imports have declined for the past several years. Imports are expected to continue falling in the near future as production grows.

If "energy independence" means that the U.S. produces all of the crude





oil that it consumes, then that seems unlikely in the foreseeable future. The EIA predicts that net imports of oil products should level out to below 40 percent of total consumption after 2020. Even under the most optimistic assumptions, net imports still remain above 20 percent of total consumption in the long run.

Producing more oil when it makes business sense is a good thing. But when it comes to oil, energy independence for energy independence's sake is probably not as desirable as one might expect. For example, energy independence in crude oil would not protect the U.S. from price spikes in the oil market even when caused by events outside the U.S. Crude oil and oil products trade on a world market. So U.S. consumers and firms would continue paying the same price as everyone else. Independence would only have a particular benefit in some sort of catastrophic situation where the U.S. literally could not purchase crude oil on the world market. However, that seems unlikely, and even then we have the strategic petroleum reserve to deal with such a supply disruption.

**Q. What are the costs that feed into gasoline prices at the pump? Are high oil prices the reason we are seeing near-record gasoline prices? Why do these prices vary across states?**

Crude oil made up about 68 percent of the retail price of gasoline in 2011, EIA data show. Federal and state taxes contributed about 11 percent to the final price, while another 11 percent was

► *“Producing more oil when it makes business sense is a good thing. But energy independence for energy independence’s sake is probably not as desirable as one might expect.”*

due to the cost of refining the oil into gasoline. Finally, about 9 percent went to distribution costs through retail outlets.

While these percentages can change over time, the cost of crude oil is always the largest component behind U.S. retail prices. Thus, if oil prices are high, gasoline prices will also be high; if they are low, then gasoline will be less expensive.

Retail prices vary significantly between countries and across different parts of the U.S. This is generally due to differences in taxes and distribution costs. For example, European retail prices for gasoline are often much higher than those in the U.S. because of higher taxes. In the U.S., prices tend to be lower on the Gulf Coast than in many other parts of the country since a lot of gasoline is produced on the coast and distribution costs are therefore lower.

Gasoline prices can also vary due to environmental considerations. California, reflecting air pollution concerns, mandates strict regulations regarding gasoline formulations. California gasoline is produced in limited quantities and is thus relatively more expensive. Not surprisingly, prices tend to be higher in California than elsewhere in the U.S.

**Q. Most commodity prices are at high levels, but natural gas is low. Why? If U.S. natural gas production is expanding, can that excess capacity be exported or used in some other way, such as for powering motor vehicles?**

The supply of natural gas in North America has rapidly grown in recent years because of the shale-gas revolution, which has driven down gas prices to very low levels in the U.S. On the other hand, natural gas remains fairly expensive elsewhere in the world.

While many commodities can be easily shipped from one location to another, this is not true for natural gas in the U.S. That helps explain why prices can be low here but higher elsewhere.

Of course, once prices diverge between markets, there will be a natural tendency for someone to figure out how to make money off of the difference. One possibility would be exporting U.S. natural gas as liquid natural gas (LNG) to other countries. However, this is a costly and time-consuming process to get started. Another is to use the natural gas domestically to produce other goods that can then be exported. Petrochemicals are a good example of this. An additional possibility is increasing domestic demand to absorb surplus supply—for example, in power plants generating electricity or as fuel for natural gas vehicles.

**Q. With rising natural gas supplies increasingly contributing to the production of electricity, what is happening to coal? What are U.S. coal producers doing with their supplies?**

U.S. power plants took advantage of collapsing natural gas prices earlier this year by increasing gas use at the expense of coal. As a result, coal producers were forced to look elsewhere for possible buyers. This contributed to sharply declining prices for steam coal, the type used to produce power.

U.S. coal exports are predicted to break records in 2012, paced by increased exports of steam coal to Europe. While natural gas is cheap compared to coal in the U.S., it is relatively pricier than coal in Europe. This has led some European power plants to produce more electricity using coal, some of it from the U.S., instead of from natural gas.

# Brutal Drought Depresses Agriculture, Thwarting U.S. and Texas Economies

By Emily Kerr

► *The drought's effects significantly suppressed U.S. economic growth in 2012. Sharply lower farm inventories subtracted 0.2 and 0.4 percentage points from already weak real GDP growth in the second and third quarters, respectively.*

**A**griculture has rarely made the difference between an expanding U.S. economy and one that is stalling. It may, however, have had such a pivotal role this year, as severe drought depressed the nation's farm output, taking a toll on broader economic growth. Texas, with more acreage devoted to farming than any other state, confronts the direct impact of two consecutive dry years.

The drought's effects significantly suppressed U.S. economic growth in 2012. Sharply lower farm inventories subtracted 0.2 and 0.4 percentage points from already weak real GDP growth in the second and third quarters, respectively.

The agricultural sector directly accounts for just 1.2 percent of GDP and 1.6 percent of employment, although its overall impact on the U.S. economy is much larger because it is linked to a variety of industries. These include processing, manufacturing and exporting, as well as inputs used in farming, such as machinery and fertilizer. The U.S. Department of Agriculture (USDA) estimated that farm and farm-related employment represents roughly 14 percent of total U.S. employment.<sup>1</sup>

The U.S. exported \$140 billion in agricultural products during 2011, representing nearly 10 percent of total exported goods. Agricultural sales abroad in 2012 will certainly be adversely impacted by drought-reduced crop production.

## Farming in U.S., Texas

Nearly 40 percent of the nation's total land area is dedicated to agriculture, about equally split between cropland and pastureland. The top five U.S. agricultural commodities are corn, cattle, dairy products, soybeans and

broilers (chickens raised for meat production). Farm receipts totaled nearly \$375 billion in 2011.<sup>2</sup>

The composition of the Texas sector differs from the U.S. as a whole. Cattle and cotton remain king in Texas with their very large farming presence.

More than three-quarters of the state's total land area is dedicated to agriculture, and a disproportionate share of it—about two-thirds—is pastureland, largely used for raising cattle. Texas boasts the largest cattle industry among the states, bringing in more than \$11 billion in annual farm receipts. Cattle, the state's No. 1 agricultural commodity, accounts for half of Texas farm receipts, compared with 17 percent for the U.S. overall.

Cotton is Texas' second-most prominent agricultural item, and the state produces 30 percent of the nation's crop. Texas is the No. 1 cotton-exporting state, and the crop is responsible for more than one-third of the state's \$6 billion in agricultural exports.<sup>3</sup>

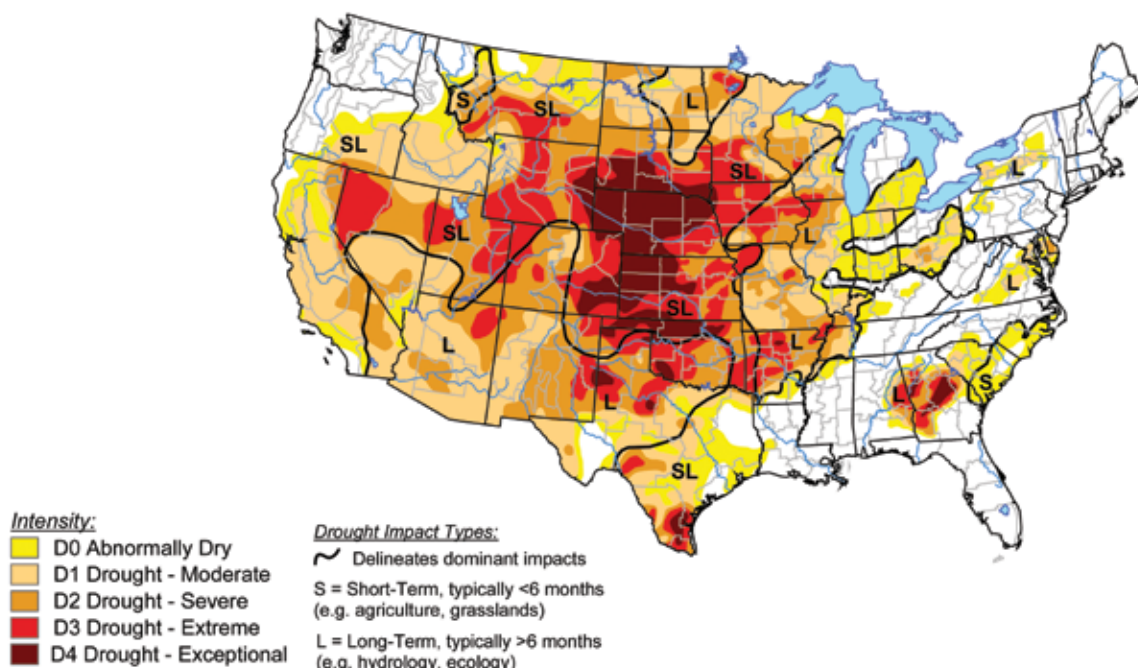
Cattle are raised throughout the state, though in greater numbers in the west; grains such as corn, wheat and sorghum are grown mostly in the temperate north and north-central regions; cotton is produced expansively in the high and low plains; vegetables and fruits are mostly grown in the subtropical south. Although Texas has the most farm acreage of all the states, the land is less productive than in many parts of the U.S.<sup>4</sup>

## Drought Déjà vu for Texas

Nearly two-thirds of the contiguous U.S. was in drought as of October 2012, compared with only 30 percent a year earlier, when drought conditions were confined to the Southwest.<sup>5</sup> The Great Plains have been hit the hardest

Chart  
1

Drought Conditions Most Severe in Great Plains



SOURCE: U.S. Drought Monitor, released Oct. 23, 2012. The U.S. Drought Monitor is produced by the National Drought Mitigation Center at the University of Nebraska–Lincoln, the U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration.

by the 2012 drought, with states such as Nebraska and Kansas experiencing widespread exceptional drought—the most severe classification (*Chart 1*).

The latest Texas conditions follow a much more severe and localized drought last year. 2011 was the driest year in Texas since records began in 1895. Conditions have since eased only slightly, and two-thirds of the state experienced a second year of drought this year.

### Crops, Livestock Suffer

The successive droughts are profoundly and distinctly affecting national and local agricultural sectors. Unusually hot and excessively dry weather has taken a toll on this year’s U.S. crop production. The USDA’s September estimates project the smallest U.S. corn crop in six years, with production down 13 percent from 2011. Soybean production is expected to decline 14 percent.

Agricultural commodity prices climbed sharply during the summer on diminished yield expectations (*Chart 2*),

with corn and soybean prices reaching inflation-adjusted levels not seen since the 1980s.

In states such as Nebraska and Kansas, where grain and soybeans account for 90 percent of farm output, higher prices largely offset reduced production. In Texas, where cotton predominates, fewer farmers benefit from bullish grain and soybean prices amid diminished yields. Cotton prices were high last year but have since declined 25 percent due to weak demand and record global cotton inventories.

Ranchers also face difficult conditions. Much of the pastureland used to support cattle herds withered under the hot, dry conditions, causing ranchers to feed grain to their herds—a very costly alternative in light of high grain prices. Hay, another food source, skyrocketed amid limited supply and very strong demand, with some ranchers paying double or triple last year’s prices.

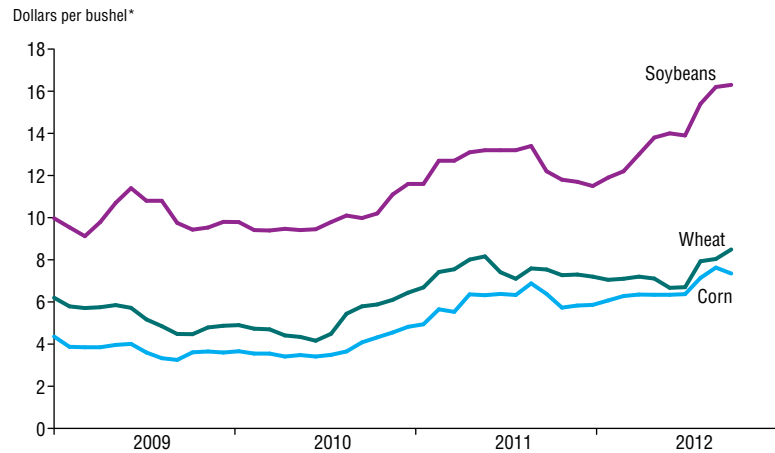
In response, ranchers sold their cattle earlier—bringing in less income due to lower animal weights—and

▶ Nearly two-thirds of the contiguous U.S. was in drought as of October 2012, compared with only 30 percent a year earlier, when drought conditions were confined to the Southwest.

▶ As much as the 2012 U.S. drought affected crop and pasture conditions, Texas confronted a far more calamitous situation in 2011.

## Chart 2

### Drought Pushes Up Grain and Soybean Prices



\*Nominal prices received by farmers.  
SOURCE: U.S. Department of Agriculture.

in larger quantities than usual. Cattle prices softened in July because of the abundance of animals going to market, although prices remained high relative to the previous 10 years. Many cattlemen were forced to sell off breeding herds that took decades to develop. Texas felt the effect more acutely because cattle make up a disproportionately large portion of the state's agriculture sector.

#### 2011 Texas Drought Severity

As much as the 2012 U.S. drought affected crop and pasture conditions, Texas confronted a far more calamitous situation in 2011. Resulting Texas agricultural losses were estimated at a record \$7.6 billion in 2011,<sup>6</sup> far exceeding the previous \$4.1 billion record, in 2006, and representing more than 40 percent of the state's average agricultural receipts. Main components of the loss were livestock, \$3.2 billion; cotton, \$2.2 billion; hay, \$750 million; and corn, \$736 million. Livestock losses reflected increased feeding costs and market losses due to lower animal weight and suppressed market prices. Crop losses stemmed mainly from high abandonment and low yields.

Only 57 percent of planted crop acreage in Texas was harvested in 2011—meaning 43 percent of acreage was abandoned due to crop failure. A comparison between the U.S. in 2012

and Texas in 2011 reveals the relatively tougher blow Texas farmers sustained (*Table 1*).

Texas corn production fell 55 percent in 2011 from the prior year, while the current drought is expected to lower U.S. corn production by only 13 percent. Texas cotton also sustained a 55 percent production loss last year, whereas U.S. cotton production is expected to increase 10 percent this year. In Texas and the U.S., crop insurance payouts largely offset the impact of higher crop abandonment and lower crop yields on farmers' incomes. Livestock producers, however, weren't covered as extensively by insurance and continue struggling with high feed costs.

#### Severe Cattle Industry Impact

As ranchers culled or completely liquidated herds under the strain of very poor pasture conditions and limited water availability, the Texas cattle population dropped by 1.4 million head from January 2011 to January 2012 (*Chart 3*)—an 11 percent decline, the sharpest in more than 75 years, leaving inventory at its lowest level since 1968. Texas still holds the largest number of cattle among the states, but its share of the national population is at a 25-year low of 13 percent. Outside of Texas, the cattle population declined 0.6 percent during 2011 as the overall U.S. inventory continued its

**Table 1**

**Dueling Droughts: Impact on Texas vs. U.S.**

	Corn		Soybeans		Cotton	
	U.S. 2012	Texas 2011	U.S. 2012	Texas 2011	U.S. 2012	Texas 2011
Crop abandonment (percent)	9	28	2	45	16	59
Crop yields (percent change, drought year vs. prior year)	-17	-36	-15	-37	-1	-23
Crop production (percent change, drought year vs. prior year)	-13	-55	-14	-69	10	-55

NOTE: 2012 U.S. figures are estimates based on forecasts as of September 2012.

SOURCES: U.S. Department of Agriculture Crop Production 2011 Summary, January 2012 (Texas data); U.S. Department of Agriculture Crop Production report, September 2012 (U.S. data).

gradual decline. The national herd has been trending down since 1975, largely a result of the beef industry raising fewer but heavier cattle.

Declining cattle inventories have put upward pressure on future retail beef prices, although the recent influx of supply eased short-term prices. Beef prices are expected to rise in 2013, a trend likely to continue amid less supply to meet domestic and global demand. Restocking herds is a gradual process, particularly since female cattle produce only one offspring per year. Restocking is also expensive, and not all ranchers will have the ability to buy back into the business. Also, downstream feedlots—which fatten cattle in preparation for slaughter—are hesitant to expand operations in the face of high feed grain prices, which squeeze margins.

**Outlook: Drought to Persist**

The Great Plains drought is expected to persist or even intensify through year-end, although conditions are likely to improve in the eastern Midwest, according to the National Oceanic and Atmospheric Administration.

Drought is certainly nothing new—farmers and ranchers have always faced periodic dry spells of varying severity. But in an economy struggling to gain momentum, the current episode brings an unwelcome drag on growth.

*Kerr is an associate economist in the Research Department of the Federal Reserve Bank of Dallas.*

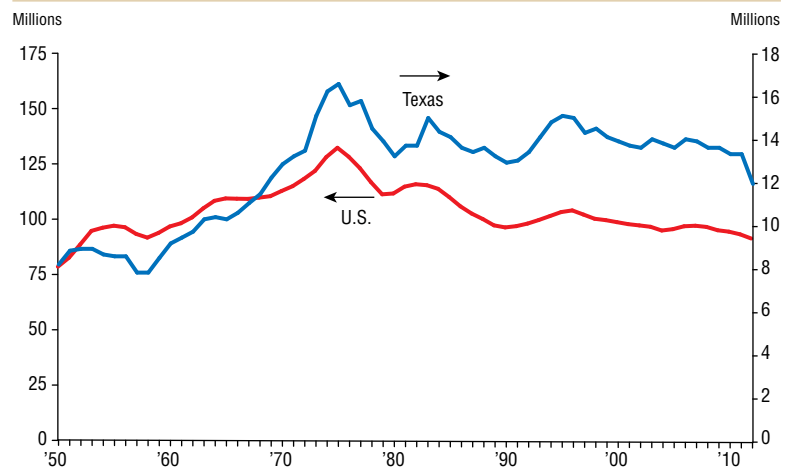
**Notes**

- <sup>1</sup> U.S. farm and farm-related employment, 2002, Economic Research Service, U.S. Department of Agriculture, Washington, D.C.
- <sup>2</sup> State Fact Sheets: United States, as of Sept. 13, 2012, Economic Research Service, U.S. Department of Agriculture, Washington, D.C.
- <sup>3</sup> All figures are from State Fact Sheets: Texas, as of Sept. 13, 2012, Economic Research Service, U.S. Department of Agriculture, Washington, D.C.
- <sup>4</sup> This is discussed further in “Agriculture: Sector’s Share of GDP Smaller in Texas than in U.S.,” by Emily Kerr, Federal Reserve Bank of Dallas *Southwest Economy*, Second Quarter, 2012.
- <sup>5</sup> Figures are from the U.S. Drought Monitor, produced by the National Drought Mitigation Center at the University of Nebraska–Lincoln, the U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration, <http://droughtmonitor.unl.edu>.
- <sup>6</sup> “Updated 2011 Texas Agricultural Drought Losses Total \$7.62 Billion,” by Blair Fannin, *AgriLife Today*, Texas A&M AgriLife Extension Service; March 21, 2012.

▶ Declining cattle inventories have put upward pressure on future retail beef prices, although the recent influx of supply eased short-term prices.

**Chart 3**

**Texas Cattle Inventory Drops Sharply in 2011**



SOURCE: Cattle Report, National Agricultural Statistics Service, U.S. Department of Agriculture.



## CONSTRUCTION: Employment Improves Across Texas During 2012

**C**onstruction employment grew at an annualized 6.7 percent rate through the first 10 months of the year, making the sector—which includes residential, commercial and industrial building—the second-fastest growing in the Texas economy after mining and logging, according to Bureau of Labor Statistics (BLS) data adjusted by the Federal Reserve Bank of Dallas. Nationally, construction jobs declined 0.2 percent over the same period. Nevada, still recovering from a severe housing bust, recorded an 11 percent construction employment drop during the period.

Despite robust growth, Texas construction employment remains 11 percent below its May 2008 peak. Nationally, it's down 28 percent from the April 2006 peak, at the height of the housing boom.

Residential building is helping the construction jobs recovery in Texas. Building construction employment increased 6 percent year to date through October in Texas, but is down 0.8 percent in the U.S. In Texas, residential builders report that shortages of framers, plumbers and electricians are delaying the completion of new homes. Texas construction laborers were paid 5 cents more per hour in 2011 than in 2010, compared with a decline of 23 cents nationally, according to the BLS's Occupational Employment Statistics. Since 2006, Texas hourly construction wages are up 10 percent in inflation-adjusted terms versus a 2.3 percent U.S. decline.

—Christina Daly



## COMPENSATION: Texas Income, Earnings Mixed in Latest Census Report

**T**exas median household income fell in 2011, while median earnings for workers rose for a second consecutive year, according to new Census Bureau estimates. Texas median household income fell to \$49,392 in 2011 from \$50,010 in 2010, a 1.2 percent decline, smaller than the 2.2 percent drop in 2010. Nationally, median household income fell 1.5 percent to \$50,054 from \$50,831. Among Texas metropolitan areas, Houston matched the statewide decline, while Dallas-Fort Worth and Austin-Round Rock-San Marcos slipped by less than 1 percentage point. Falling household income can be attributed in part to a shrinking labor force and the loss of well-paying jobs in government and finance and real estate—the latter especially occurring in Dallas-Fort Worth in the aftermath of the 2008-09 recession.

Still, Texas workers earned more. Median earnings rose 1.4 percent to \$28,015 in 2011 from \$27,620 in 2010, while nationally they fell 2.5 percent. Although Texas numbers look good compared with the rest of the country, the estimates continue to reflect a trend of the “hollowing out” of the middle class. Between 2010 and 2011, the share of Texas households with incomes between \$35,000 and \$100,000 shrank to 54.1 percent from 55 percent.

Furthermore, Texas' poverty rate rose to 18.5 percent in 2011 from 17.9 percent in 2010, continuing a trend of increasing poverty that has persisted since the recession.

—Melissa LoPalo



## POLLUTION: More Natural Gas, Less Coal Pace CO<sub>2</sub> Emissions Drop

**C**arbon dioxide (CO<sub>2</sub>) emissions in the U.S. in first quarter 2012 were at the lowest level for any first quarter in 20 years. Data from the Energy Information Administration (EIA) show that U.S. CO<sub>2</sub> emissions from energy consumption totaled 1,340 million metric tons (mmt) in first quarter 2012, an almost 8 percent decrease from first quarter 2011. First-quarter emissions have not been this low since 1992, when they roughly totaled 1,339 mmt.

The mild winter, a decline in coal-fired electricity generation in favor of natural gas-fired power, and reduced gasoline demand combined to lower emissions at the beginning of the year. CO<sub>2</sub> emissions are usually highest in the first quarter each year due to heating demand, according to the EIA.

Using cheaper natural gas to generate electricity is particularly important in emissions reductions. Natural gas produces the lowest CO<sub>2</sub> emissions of any fossil fuel, making it a much cleaner energy source than coal. Increasing supplies of gas, mainly shale gas, sent natural gas prices to a historical low in 2012. Shale gas is accessible through hydraulic fracturing, or fracking.

A reduction in emissions is good news for the U.S., but there are caveats. Global CO<sub>2</sub> levels are still rising, and natural gas price increases could reverse emissions drops if coal use increases. Additionally, fracking has raised environmental concerns, some involving groundwater contamination.

—Amy Jordan

# Dollar-Sensitive Mexican Shoppers Boost Texas Border Retail Activity

By Roberto A. Coronado and Keith R. Phillips

**M**exican citizens logged 70 million border crossings into Texas in 2011. While some came for work, school or family reasons, many traveled to border cities to shop.

Cross-border retail trade is crucial to border-city economies. Mexicans spend more than \$4.5 billion annually on food, clothing, auto parts and other retail items in these cities, primarily El Paso, McAllen, Brownsville and Laredo, Federal Reserve Bank of Dallas research shows. Geographic proximity, border-crossing cards that expedite movement, attractive prices and broad product selection are among the draws.

But shoppers' purchasing power matters, too. On that count, Texas border retailers struggled to attract business during the second half of last year and the first part of 2012 because peso weakness (dollar strength) made goods relatively more expensive. In recent months, the peso has strengthened and lifted retail sales.

Since the 1970s, border scholars have attempted to estimate the size of cross-border retail trade. Because Mexicans' shopping transactions on the U.S. side are mostly in cash, valuing the volume of activity is difficult. To obtain an estimate, we assume that individuals spend a fixed proportion of their income on consumption, or in this case, retail sales.<sup>1</sup> In essence, we estimate the purchasing power of local residents. If an area's retail sales exceed what locals are spending, Mexican visitors' shopping likely accounts for the difference.

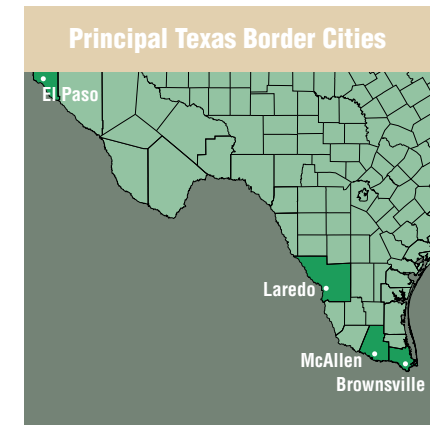
The results suggest that Mexican trade represents a significant share of Texas border-city retail activity, ranging from 40 to 45 percent in Laredo, 35 to 40 percent in McAllen, 30 to 35 percent in Brownsville and 10 to 15 percent in El Paso. While El Paso relies mostly on shoppers from its sister border city, Ciudad Juárez, Rio Grande Valley communities draw to a

greater extent from interior cities such as Monterrey.

Peso-dollar exchange rate fluctuations significantly influence cross-border shopping activity (*see chart*). For instance, the peso began losing value in third quarter 2008, falling from roughly 10 pesos per dollar to almost 15; in turn, border city retail sales contracted almost 15 percent. Conversely, when the peso rose against the dollar during 2009–11, Texas border retail sales quickly inched up.

When the peso lost ground again against the dollar in the first half of this year, Texas border cities—particularly in the Rio Grande Valley—felt the pinch, as evidenced by weak growth in retail-dependent employment. A high crime rate in northern Mexico also likely affected border retail activity. Reports of crime along the highways connecting Monterrey to McAllen and Laredo deterred Mexican shoppers' travels, according to anecdotal evidence.

The good news is that the peso has strengthened almost 10 percent against

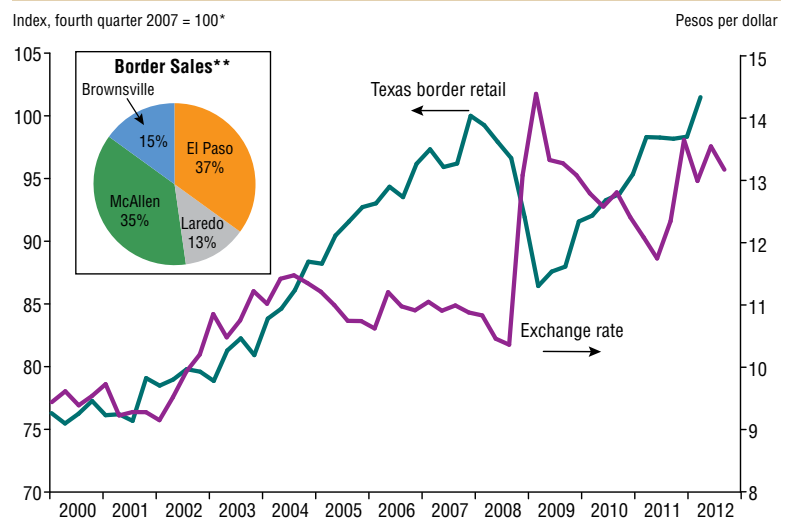


the dollar since June, and some headway has been made on public security. Given these improvements, Mexican shopping in Texas should increase in coming months.

## Note

<sup>1</sup> "Cross-Border Retail Activity Along the Texas–Mexico Border," by Roberto A. Coronado, Keith R. Phillips and Eduardo Saucedo, Federal Reserve Bank of Dallas Working Paper, forthcoming 2013.

## Border Retail Sales React to Exchange Rate Changes



\*Real, seasonally adjusted.

\*\*Reflects each city's estimated share of total sales in the four largest Texas border cities.

SOURCES: Texas Comptroller of Public Accounts; Banco de México.

# Booming Shale Gas Production Drives Texas Petrochemical Surge

By Jesse Thompson

**A** highly profitable petrochemical industry has reemerged in Texas from the boom in U.S. shale oil-and-gas exploration, creating an internationally competitive sector that can produce a variety of products including plastics at a lower cost.<sup>1</sup>

Advances in the exploration of shale, the source rock from which oil and gas have seeped for millions of years, have brought to market new supplies of oil, natural gas and natural gas liquids (NGLs) such as ethane, a key petrochemical feedstock or input. This modern-day gusher was made possible by hydraulic fracturing (also known as fracking) and horizontal drilling in the United States.

These technologies have helped reduce the price of natural gas, which was once in line with oil, and led to the production of lower-cost NGLs (*Chart 1*). Because U.S. petrochemical firms commonly use NGLs for feedstock, their input costs have fallen and they have gained an export advantage over competitors in other parts of the world that heavily rely on much pricier oil-based naphtha.

At the epicenter of the shale boom is Texas, a significant player in the U.S. petrochemical industry and home to some of the nation's most productive shale areas. The state is reaping economic gains from the petrochemical resurgence that include increases in construction, jobs and exports.

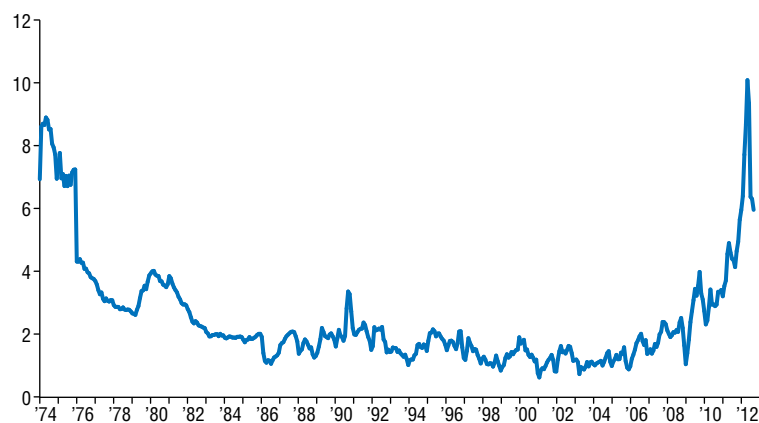
## Changing Hydrocarbon Industry

Ethane and propane are key NGLs in ethylene—an intermediate petrochemical used in polyethylene, polyvinyl chloride, some polyesters and other substances. Those substances become components of products such as PVC pipe and an array of plastics and industrial products.

Chart  
1

Oil Prices Rise, While Gas Falls on Higher Supplies

Price of oil relative to natural gas\*



\* Refiners' acquisition cost of imported crude relative to wellhead price of natural gas.

SOURCES: Energy Information Administration; author's calculations.

Globally, the growth rate for ethylene production slowed in the decade before the recent recession. After averaging 5 percent annually from 1990 to 2000, the rate declined, almost matching global gross domestic product growth of 2.5 percent from 2000 to 2009.<sup>2</sup> Demand for petrochemicals was increasingly concentrated in emerging markets where U.S. manufacturers couldn't overcome a strong dollar and international transportation costs. As a result, U.S. petrochemical firms confronted a steadily eroding outlook that left little justification for investment in new facilities.

The unlocking of hydrocarbons within shale and the resulting decline in natural gas prices—from \$6.25 per thousand cubic feet (Mcf) in 2007 to \$2.40 in the first half of 2012—changed the petrochemical industry.<sup>3</sup>

Shale fracking and horizontal drilling technologies in the early 2000s yielded discoveries in the Barnett Shale

in North Central Texas before spreading to the Eagle Ford in South Texas; the Haynesville in Arkansas, Louisiana and East Texas; and the Marcellus in the Northeastern U.S.

These technologies not only led to the initial natural gas finds, but also proved successful at extracting oil and other liquids.

The Eagle Ford is expected to produce more than 90 million barrels of oil and 51 million oil-equivalent barrels of natural gas in 2012 after yielding less than 10 million barrels of both in 2009. Total annual Texas oil production, which fell steadily for decades and bottomed out in 2007 at 391 million barrels, may reach 712 million barrels this year—an 82 percent increase over five years.<sup>4</sup>

When global commodity prices spiked in 2008, natural gas prices soared to \$10.79 per Mcf and oil reached a high of \$127.77 per barrel. Both tumbled amid the global



economic recession, with natural gas falling to \$3.70 per Mcf and oil sliding to \$36.84 per barrel in early 2009. Gas prices rebounded to \$5.69 per Mcf by January 2010, only to begin a sustained decline that just recently showed signs of abating. Oil, meanwhile, hovered between \$70 and \$80 per barrel in 2010 and has stood at around \$100 since March 2011.

Fracking expanded the U.S. production of natural gas and NGLs far more rapidly than the market could absorb them or export them, unwinding more than a decade of rising input costs for U.S. petrochemical firms. Natural gas prices this year reached their lowest levels since 1975, adjusted for inflation. Ethane and propane tumbled 40 percent to their lowest prices in at least two decades.<sup>5</sup>

The Eagle Ford, with its significant amounts of oil and NGLs and a network of pipelines and plants, feeds Texas refining and petrochemical facilities.<sup>6</sup> Overall, Texas accounts for 72 percent of U.S. ethylene capacity.

### A Boon to U.S. Competitiveness

While the U.S. petrochemical industry primarily uses NGLs (mostly ethane) to make ethylene, other areas of the world (outside the Middle East) heavily rely on naphtha (*Table 1*). Naphtha has followed oil prices higher.

Underscoring the impact of diverging oil and natural gas prices, it cost 60 cents to produce a pound of ethylene with nearly 12 cents worth of ethane in September 2012; alternatively, one pound of ethylene required \$1.37 of naphtha. While the NGL-based product was clearly profitable, the oil-based version was not (*Chart 2*).

From May 2011 to September 2012, the difference in the feedstock costs rose fivefold.

### Investing in New Capacity

The U.S.—with Texas at the forefront—has become a highly cost-effective place to invest in new petrochemical plants, even if the market for that new production is in emerging economies.<sup>7</sup> Ethylene capacity is poised to increase almost 33 percent

by 2017, pending completion of all new plants, expansions, enhancements and restarts of shutdown facilities that have been announced in the U.S. (*Table 2*).<sup>8</sup>

Obtaining permits for these new projects can take more than two years, with individual facilities representing an investment of \$350 million to \$1.7 billion. The regional economic impact of the construction alone should be significant, with Gulf Coast crews earning from \$25 an hour for experienced personnel to \$40 an hour for the slightly more than 10 percent of the workforce with specialized skills. Machining and fabrication of pipes, fittings, valves and other specialty components for these facilities could provide more work for U.S. firms. Moreover, these new and revamped facilities

► *The U.S.—with Texas at the forefront—has become a highly cost-effective place to invest in new petrochemical plants.*

**Table 1** U.S. Favors Natural Gas Liquids in Ethylene Production; Other Nations Use Oil-Based Naphtha

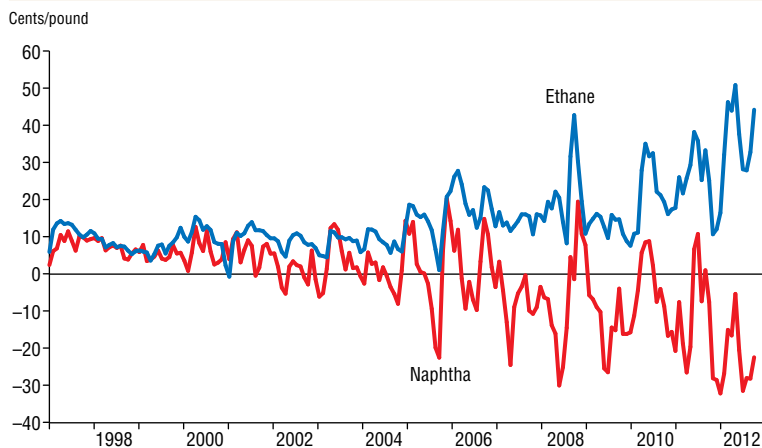
Area	Nameplate capacity, 2011*	Feedstock mix, 2011 (percent)**		
		NGL	Naphtha	Other
Asia Pacific	29.2	21	76	3
Middle East	24.1	75	21	4
United States	27.6	59	30	11
Western Europe	24.4	20	71	9
Rest of the world	38.9	47	45	8

\*Nameplate capacity refers to the theoretical maximum output in a given year under ideal conditions.

\*\*Percent of capacity reporting feedstock usage in each region: Asia Pacific, 82 percent; Middle East, 46 percent; U.S., 99 percent; Western Europe, 89 percent; rest of the world, 56 percent.

SOURCES: 2012 International Survey of Ethylene Steam Crackers; author's calculations.

**Chart 2** Profit Margins Grow for Ethylene Made from Ethane



SOURCES: Muse, Stancil and Co.; author's calculations.

▶ Texas is a leading exporter, accounting for 17 percent of all U.S. exports in 2011, including 24 percent of chemicals and 12 percent of plastics and rubber products—categories that include resins for pipes, toys, plastic cups and antifreeze.

**Table 2** Shale Gas Spurs Investment in Ethylene Capacity

Company	Project	Capacity	Location	Cost	Start-up
ExxonMobil Chemical	New cracker	1.5m tons	Baytown, TX	n.a.	2016
Chevron Phillips Chemical	New cracker	1.5m tons	Cedar Bayou, TX	n.a.	1Q 2017
Dow Chemical	New cracker	>800,000 tons	U.S. Gulf Coast	n.a.	2016-17
Shell	New cracker	>800,000 tons	U.S. Northeast	n.a.	2016-17
Formosa Plastics	New cracker	800,000 tons	Point Comfort, TX	\$1.7bn	2016
Dow Chemical	Restart	390,000 tons	St. Charles Parish, LA	n.a.	End 2012
LyondellBasell	Expansion	386,000 tons	La Porte, TX	n.a.	2014
Williams	Expansion	272,158 tons	Geismar, LA	\$350m-\$400m	3Q 2012
Westlake Chemical	Expansion	113,399 tons	Lake Charles, LA	n.a.	2014
Westlake Chemical	Expansion	108,863 tons	Lake Charles, LA	n.a.	Midyear 2012
INEOS	Debottleneck	115,000 tons	Chocolate Bayou, TX	n.a.	End 2013

NOTES: Crackers are plants that refine ethane into ethylene. The entry "n.a." denotes that the project cost was not available. SOURCE: ICIS.

will require highly skilled personnel to monitor and maintain plant systems.

To take advantage of export opportunities, ethylene must be sent to other new or expanded chemical facilities that will transform it and other intermediate products into consumer goods and components for further manufacturing. The construction and expansion at this stage is similarly valuable. For example, Chevron Phillips has announced two polyethylene facilities in addition to a new ethylene plant in Southeast Texas, representing an estimated \$5 billion total investment.<sup>9</sup>

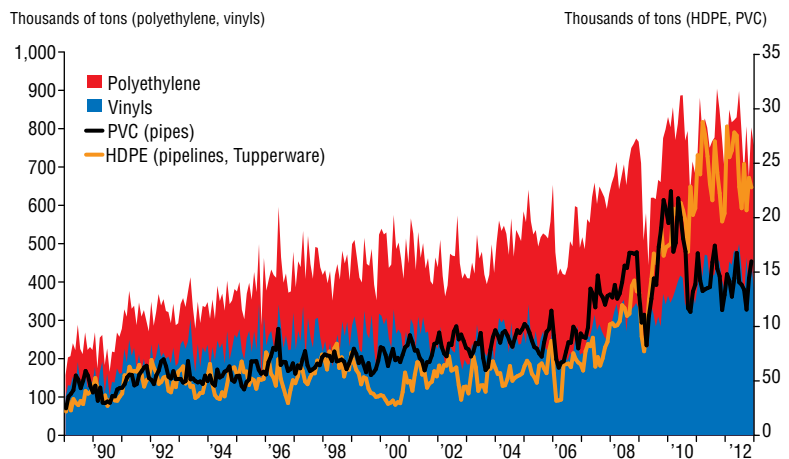
### Building Export Trade

Texas is a leading exporter, accounting for 17 percent of all U.S. exports in 2011, including 24 percent

of chemicals and 12 percent of plastics and rubber products—categories that include resins for pipes, toys, plastic cups and antifreeze.

The value and tonnage of Texas petrochemical exports have grown over the last decade on strong global activity. More recently, shipments have soared on cost advantages and foreign markets' relative attractiveness. This is particularly true for two ethylene-based products—polyethylene and vinyls. Polyethylene has been an increasingly important export over the last 20 years, doubling its share to nearly half of all ethylene-related chemicals and resins sent abroad (*Chart 3*).<sup>10</sup> Polyethylene is used for such items as plastic lids and containers, packaging for consumer products, televisions and

**Chart 3** Exports of Major Ethylene Products Soar



SOURCES: International Trade Commission; author's calculations.

cell phones. Vinyls make up a similar share of ethylene-related chemical exports and are overwhelmingly tied to construction-related products such as the large pipes used in municipal water operations. As U.S. construction tumbled at the outset of the recent recession, sales abroad of polyvinyl chloride pipe, also known as PVC, increased.

Overall, greater domestic ethylene production capacity will significantly outstrip projected domestic demand growth over the next several years. As a result, U.S. petrochemical exports, particularly from Texas, will expand significantly.

### Robust Outlook for U.S. Firms

U.S. producers of ethylene-based petrochemicals have gained a significant cost advantage and greater global competitiveness because of relatively inexpensive and plentiful NGLs from hydraulic fracturing of shale. Projects capitalizing on the shale boom will drive a wave of construction as plants are built and pipeline infrastructure and storage capacity are expanded along the Gulf Coast over the next five years.

The extent of the construction depends on several factors, including regulatory constraints.<sup>11</sup> Whatever the outcome, cheaper raw material inputs are likely to uniquely benefit Texas firms for some time, and petrochemicals will become an increasingly important component of already expanding Texas exports.<sup>12</sup>

*Thompson is a business economist in the Houston Branch of the Federal Reserve Bank of Dallas.*

### Notes

<sup>1</sup> "Petrochemical" refers to a group of substances that are ultimately derived from oil or natural gas. The term is usually applied to substances such as ethylene, propylene and their byproducts, which are used to make plastics, among other things. "Petroleum product" usually refers to substances with molecular properties such as those of gasoline and diesel.

<sup>2</sup> See "Petrochemicals: Preparing for a Supercycle," Morgan Stanley Blue Paper, Oct. 18, 2010, [www.morganstanley.com/views/perspectives/preparingfor\\_supercycle.pdf](http://www.morganstanley.com/views/perspectives/preparingfor_supercycle.pdf).

<sup>3</sup> See "Oil Boom in Eagle Ford Shale Brings New Wealth to South Texas," by Bill Gilmer, Raúl Hernandez and Keith R. Phillips, Federal Reserve Bank of Dallas *Southwest Economy*, Second Quarter 2012.

<sup>4</sup> Projection based on the average monthly increase in Texas production in 2012 through August.

<sup>5</sup> Mont Belvieu and Conway NGL spot prices from Bloomberg.

<sup>6</sup> Data from the 2012 International Survey of Ethylene from Steam Crackers.

<sup>7</sup> Ethylene plants are also referred to as "crackers," a term that describes the process of breaking up—or cracking—feedstock into smaller units such as ethylene.

<sup>8</sup> "ExxonMobil Brings Total U.S. C2 Expansions to over 33 Percent of Capacity," by Joseph Chang, ICIS, June 1, 2012, [www.icis.com/Articles/2012/06/01/9566472/exxonmobil-brings-total-us-c2-expansions-to-over-33-of.html](http://www.icis.com/Articles/2012/06/01/9566472/exxonmobil-brings-total-us-c2-expansions-to-over-33-of.html).

<sup>9</sup> "Chevron Phillips Chemical Chooses Old Ocean, Texas, Site for New Polyethylene Plants," by Bernardo Fallas, Platts, April 30, 2012, [www.platts.com/RSSFeedDetailedNews/RSSFeed/Petrochemicals/6243222](http://www.platts.com/RSSFeedDetailedNews/RSSFeed/Petrochemicals/6243222).

<sup>10</sup> The data presented were limited to resins and chemicals within the ethylene chain that make up the bulk of export tonnage, and largely excluded end products. Examples of included substances are vinyl chloride (chloroethylene), ethylene dichloride, trichlorethylene, vinyl acetate and polymers, PVC and polymers, HDPE (high-density polyethylene), linear low-density polyethylene, low-density polyethylene, other polymers of ethylene, ethylene copolymers, etc.

<sup>11</sup> Many considerations are not addressed in this article, including the potential environmental impact of these facilities and of hydraulic fracturing, the effects on property taxes and the potential impact of a capacity overbuild.

<sup>12</sup> See "U.S. LNG Exports Truth and Consequence," by Kenneth B. Medlock, James A Baker III Institute for Public Policy, Rice University, Aug. 10, 2012, [http://bakerinstitute.org/publications/US%20LNG%20Exports%20-%20Truth%20and%20Consequence%20Final\\_Aug12-1.pdf](http://bakerinstitute.org/publications/US%20LNG%20Exports%20-%20Truth%20and%20Consequence%20Final_Aug12-1.pdf).

► Overall, greater domestic ethylene production capacity will significantly outstrip projected domestic demand growth over the next several years. As a result, U.S. petrochemical exports, particularly from Texas, will expand significantly.

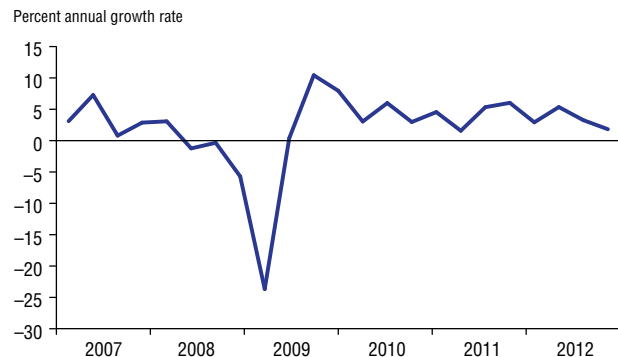
## SNAPSHOT

# Mexico's Economic Expansion Slows

**M**exico's economy appears to have slowed. Third-quarter real gross domestic product grew at an annual rate of 1.8 percent on a quarter-over-quarter basis, down from 3.3 percent in the second quarter and 5.4 percent in the first quarter. In third quarter 2012, goods-producing industries (including manufacturing, construction, utilities and mining) expanded at a 2.9 percent annualized rate. Service-related activities (including trade, transportation, services and government) grew 3 percent on an annualized basis from the previous quarter. Agricultural output fell 2.2 percent. Exports fell, while employment, industrial production and retail sales advanced in September.

Inflation is still running above target but fell for the second month in a row, down to 4.2 percent in November, after increasing for five consecutive months. The exchange rate of 12.8 pesos per dollar is up about 7 percent against the dollar since the beginning of the year. Aware of the economic slowdown but leery of inflation, Banco de México

### Mexico Gross Domestic Product



SOURCE: Instituto Nacional de Estadística y Geografía.

has not changed its monetary policy stance, holding the benchmark interest rate at 4.5 percent since July 2009.

—Adapted from *the Mexico Economic Update*,  
Federal Reserve Bank of Dallas

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