

July 2016

INSIDE THIS ISSUE

- Cost Pass-through Rule Reduces Incentive to Stop Methane Leaks
- Tracking the Dust Bowl Migrants of the 1930s
- Why So Many Investors Believe Trouble Lies Ahead
- ‘Pay to Delay’ Settlements in Patent Litigation
- Volatility and the Gains from Trade

Real Effects of Liquidity during the Financial Crisis

U.S. car sales have long depended on the existence of nonbank lenders, particularly the financing arms of car manufacturers. These lenders, who specialize in cars and car buyers, have been much better equipped than banks to gauge the risk of individual car loans and more willing to accept purchased cars as collateral. In 2005, loans from nonbank lenders funded more than half of U.S. car sales.

A run in the asset-backed commercial paper market in 2008 contributed to the collapse of car sales in 2009.

These nonbank lenders are more vulnerable to economic downturns than banks. While banks can fund loans from FDIC-insured deposits, nonbank lenders rely on short-term credit markets for funding, principally the asset-backed commercial paper (ABCP) market. In 2008, buyers of short-term debt left the ABCP market en masse. This resulted in the devaluation of the assets the nonbank lenders could sell to cover their losses, and it rendered those lenders unable to extend credit to car buyers. Several of these lenders collapsed, including General Motors

Acceptance Corporation (GMAC), one of the world’s largest providers of auto financing. Car sales fell sharply in 2009, and GM and Chrysler filed for bankruptcy.

In **The Real Effects of Liquidity During the Financial Crisis: Evidence from Automobiles** (NBER Working Paper No. 22148), [Efraim Benmelech](#), [Ralf R. Meisenzahl](#), and [Rodney Ramcharan](#) find that illiquidity in the ABCP market was responsible for about one third of the dramatic drop in car sales in 2009.

To estimate linkage between the ABCP market and car sales, the researchers used two data sets. The first, a proprietary data set from R. L. Polk & Company of all new-car sales in the U.S. from 2002 onward, listed the financing source and institution, vehicle make and model, and county of registration

for each sale. Because the Polk data set contained no information on borrower characteristics, the researchers also used an Equifax data set of three million borrowers that included each borrower’s age, detailed credit history information, and data on whether a borrower’s car loan came from a bank or a nonbank lender.

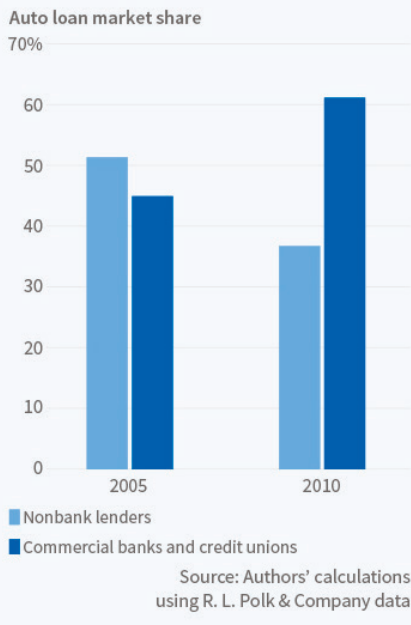
Comparing car sales across counties

as the financial crisis unfolded, they found that car sales fell more sharply in counties where nonbank car loans were more prevalent. “In particular,” they report, “a one standard deviation increase in nonbank dependence is associated with a 1 percentage point or 0.08 standard deviation decline in the growth in new car transactions over

the 2008–2009 period.”

Car sales also fell in 2009 because

Nonbank share of auto lending dropped during financial crisis



job losses, devaluation of homes and other assets, and reductions in credit-card limits made it difficult for buyers to afford new cars. Those most likely to be hard-hit by the recession were lower-credit-quality borrowers who were most likely to obtain their car

loans from nonbank lenders. In their analysis, the researchers controlled for house price, household leverage, net worth, unemployment, FICO scores, and home-ownership status, as well as for different models of cars sold at different price points. Including these

controls did not attenuate the estimated effect of the ABCP market on car sales. Moreover, at the county level, the researchers found no association between mortgages or revolving lines of credit and auto sales.

— Deborah Kreuze

Cost Pass-through Rule Reduces Incentive to Stop Methane Leaks

Methane, the primary component of natural gas, is a greenhouse gas with 34 times the global warming potential of carbon dioxide. It is estimated that more than one percent of methane in the U.S. supply chain escapes into the atmosphere, and that 20 percent of this leakage occurs from degraded pipes and loose-fitting components during distribution of natural gas to homes and businesses.

In **Price Regulation and Environmental Externalities: Evidence from Methane Leaks** (NBER Working Paper No. 22261), [Catherine Hausman](#) and [Lucija Muehlenbachs](#) show that current regulatory structures weaken the incentives for gas distribution firms to find and fix these leaks.

Because natural gas distribution requires extensive infrastructure investment, it is a natural monopoly that is regulated to ensure that customers can purchase the gas at a fair price while providing utility investors with adequate returns. Regulations negotiated by local

public utility commissions usually permit distribution companies to pass on the cost of leaked gas to retail customers. This means that the distribution compa-

nies have less incentive to fix leaks than they would if they had to bear the lost-gas costs themselves.

The researchers estimate that the

property damage, and methane's contribution to climate change far exceeds the life and property losses. In 2015, the climate-change impact of the gas leaked in

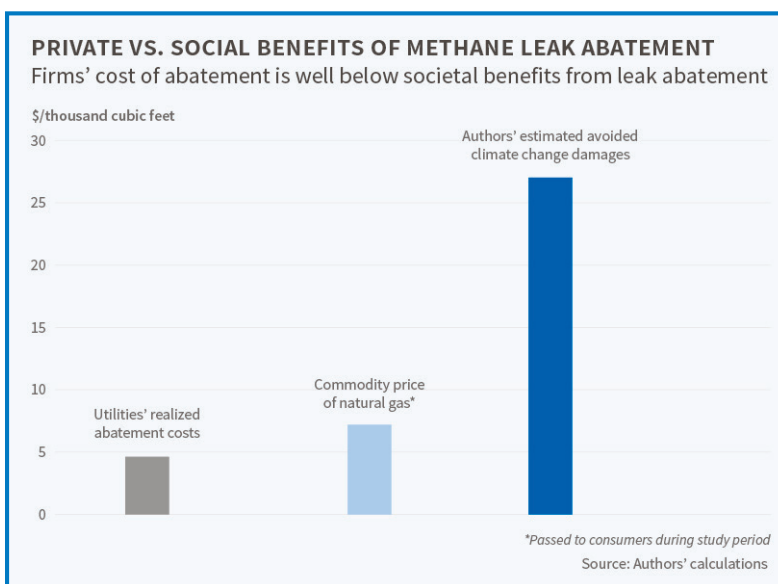
Regulations allow natural gas distribution companies to pass the cost of leaked gas to retail consumers, with safety and climate consequences.

the U.S. from wellhead to end-user was estimated at more than \$8 billion.

Drawing upon data from several government agencies on the operations of 1,500 natural gas companies from 1995 to 2013, the researchers estimate the cost of abatement activities undertaken by utilities and find that, although natural gas distribution companies do repair leaks, the amount they spend on leak detection and repair is substantially below the value of the leaked gas.

In recent years, new safety regulations have required

utilities to work more actively to detect and fix leaks. The researchers find that new standards from the U.S. Department of Transportation's



social cost of methane leaks is far higher than the commodity value of the lost gas. Accumulated leaked methane can explode, causing human deaths and

Pipeline and Hazardous Materials Safety Administration that took effect in August 2011, and regulations issued by the California Public Utilities Commission after a 2010 gas explo-

sion in San Bruno, California, have led to leak repairs around the country—with economic and climate benefits on top of the safety benefits the regulations were intended to realize.

The authors conclude that repairs could be made that would yield more savings in unleased gas than the cost of the repairs themselves.

—Deborah Kreuze

Tracking the Dust Bowl Migrants of the 1930s

Tragic images of the Dust Bowl's desolate farmlands and destitute migrants were ingrained into the American consciousness by John Steinbeck's classic novel *The Grapes of Wrath* and by the iconic photos of Dorothea Lange.

Huge swaths of the Southern Great Plains were devastated in this human and environmental disaster of the 1930s. But did events really unfold as the popular account suggests? More than 70 years later, [Jason Long](#) and [Henry E. Siu](#) develop new evidence on how many people left the Dust Bowl region, who they were, and where they went. Their findings challenge conventional wisdom.

In **Refugees From Dust and Shrinking Land: Tracking the Dust Bowl Migrants** (NBER Working Paper No. 22108), they examine census data and other source materials. They find that the out-migration rate was much higher from the Dust Bowl region than from other parts of the Depression-stricken coun-

try, and farmers were the least likely to leave impacted areas. Moreover, total out-migration was only slightly higher than in the previous decade. The depopulation of Dust Bowl areas was predominantly the result of dramatically

fewer people moving *into* the region. The researchers also find that California was the destination for only a minority of those who fled.

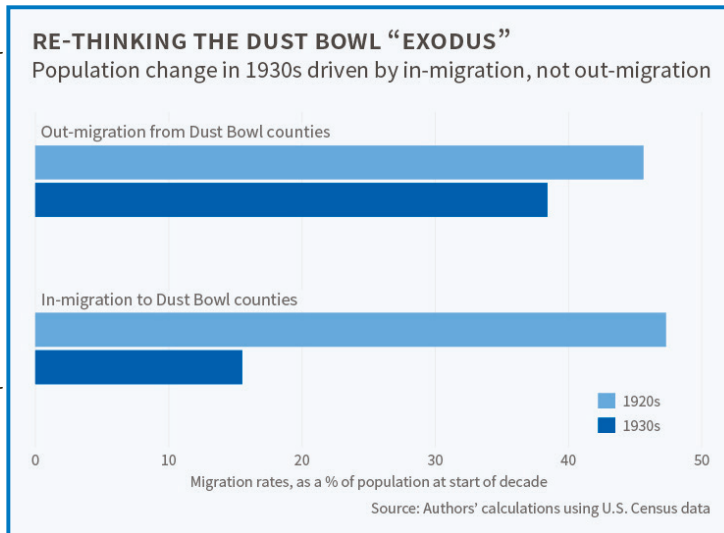
Depopulation was due more to falling in-migration than rising out-migration; most of those who left were not farmers, and only a minority went to California.

There is little disagreement that the Dust Bowl was the result of an almost perfect storm of environmental and economic events, starting in the early 1930s with a drought, and compounded by the enormous economic hardships

U.S. Census and other sources such as Ancestry.com, the researcher focus on individuals living in the 20 hardest-hit counties in four states: Colorado, Kansas,

Oklahoma, and Texas. They analyze data from 1920 through 1930, before the Dust Bowl, and 1930 through 1940, during the dramatic events.

They find a population decline of 19.2 percent, from 120,859 people to 97,606 people, in the Dust Bowl counties studied, compared to a 4.8 percent increase in population in other parts of the four states during the same period. However, they also discover that the 20 counties had undergone tremendous migration “churn” in the years immediately after World War I, experiencing an in-migration rate of 47.3 percent in the 1920s, as the area boomed. In-migration fell to only 15.5 percent in the 1930s. The researchers conclude that depopulation was largely the result of falling numbers of new residents moving to these counties and “was not due to an extraordinary exodus relative to historical norms.”



caused by the Great Depression. These circumstances led to severe soil erosion, crop failures, unemployment, failed farms and businesses, foreclosures, and, ultimately, human migration.

Using longitudinal data from the

They also find that farmers — so closely associated with the Dust Bowl tragedy in literature and films — were actually the least likely to move from the area. Instead, they tended to remain and to retain their assets and properties while others fled.

Where did migrants go? The majority of those who left the 20 study counties stayed in the four states covered by the study, while about 37.1 percent left. Contrary to the enduring image of “Okies” fleeing en masse to California, the research finds that migrants from the Dust Bowl

region were no more likely to move to California than migrants from other parts of the U.S., or those from the same region ten years prior. “In this sense, the westward push from the Dust Bowl to California was unexceptional,” the researchers report. —Jay Fitzgerald

Why So Many Investors Believe Trouble Lies Ahead

Investors’ beliefs about whether a severe market crash is impending can affect the prices and prospective returns on risky assets, such as publicly traded stocks. However, beliefs regarding extreme market events are difficult to measure using typical economic data, precisely because they are low-probability outcomes. Observed asset prices are also determined by investor preferences, such as their degree of risk tolerance, as well as by beliefs about future outcomes.

In **Crash Beliefs from Investor Surveys**, (NBER Working Paper No. 22143), William N. Goetzmann, Dasol Kim, and Robert J. Shiller provide direct evidence using surveys that capture investor beliefs regarding stock market crashes between 1989 and 2015. The researchers find that investors routinely overestimate the likelihood of severe crashes.

When asked about the probability of a crash similar to that on Black Tuesday (October 29, 1929) or Black

Monday (October 19, 1987) occurring in the next six months, the median response was a probability of 10 per-

The prevalence of attention in financial media to adverse market outcomes is correlated with investor crash beliefs.

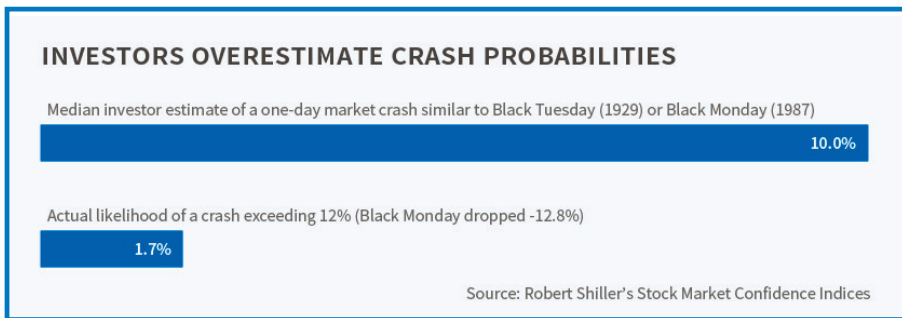
cent. Historical data from 1929 to 1988, however, indicate that the likelihood of such a crash is only 1.7 percent.

The researchers investigate behavioral channels that could contribute to this phenomenon by examining whether investor crash beliefs are sub-

The researchers find that investors use recent stock market performance to estimate their crash prob-

abilities. Media coverage makes the effects of market downturns on crash beliefs more salient, particularly for non-professional investors. In addition, they provide consistent evidence of the influence of behavioral mechanisms using other rare events that are unrelated to stock market activity, such as earthquakes.

The research findings add to a large literature on the ways in which financial decision-making may deviate from textbook models of rational choice. The findings may help to inform other areas where rare disaster concerns are relevant, including the long-standing equity premium puzzle, time-varying market premiums, and the so-called volatility smile. —Andrew Whitten



ject to media influence. They show that stock market downturns are more likely to be reported in financial media than upswings. They posit that the results are consistent with investors exhibiting “availability bias,” or that investors assign greater weight to “top-of-mind” information.

‘Pay to Delay’ Settlements in Patent Litigation

In an effort to promote generic entry and greater competition in the drug market, a section in the 1984 Hatch-Waxman Act — Paragraph IV — encourages makers of generic drugs to challenge pharmaceutical patents. These “Paragraph IV challenges” are on the rise, at least in part because the act and subsequent court rulings entitle a challenging firm to share in the patent holders’ profits for the drug at issue for 180 days.

In some cases, the manufacturers of the patented products have settled with the potential generic entrant and agreed to share the profits from the patented product, sometimes for a period of years, if the potential entrant will delay production of a generic competitor. These so-called “pay for delay” settlements delay generic entry, and they have been labeled as collusive by the Federal Trade Commission. But how do they affect consumer welfare?

“Back-of-the-envelope estimates suggest that settling... challenges reduces consumer surplus by \$835 million over 5 years,” write [Eric Helland](#) and [Seth A. Seabury](#) in [Are Settlements in Patent Litigation Collusive? Evidence from Paragraph IV Challenges](#) (NBER Working Paper No. 22194).

The researchers note that the Hatch-Waxman Act tried to strike a balance, encouraging the production of generic drugs to increase price

competition while preserving enough profit for patent-holding drug companies so that they would continue to invest in expensive research and devel-

Negotiated agreements in patent litigation appear to delay generic entry and raise drug prices.

opment (R&D). They find some evidence of this balance. If a maker of a generic drug initiates a Paragraph IV challenge and there is no settlement observed, the probability of a generic drug appearing in the marketplace rises by 68 percentage points over a

mean that settlements in Paragraph IV challenges really are collusive, the practical impact of settlements appears to be that they inflate

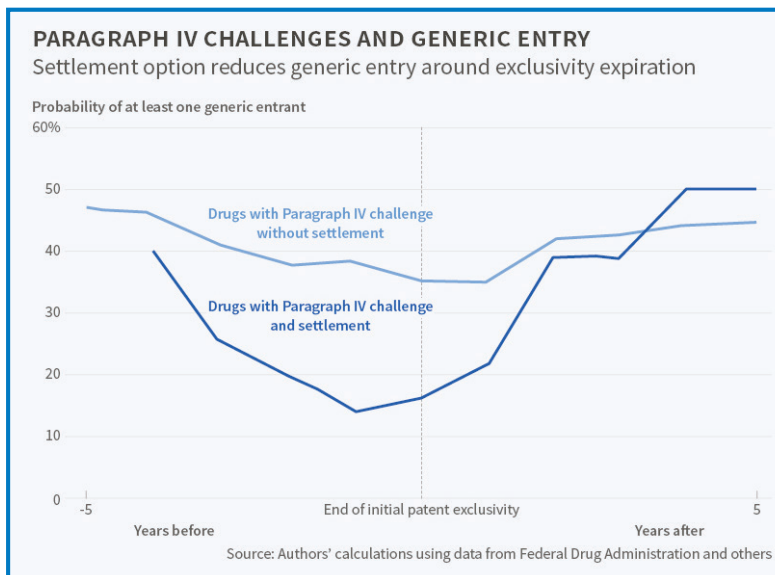
prices and depress quantity for up to several years after the challenge, though in the longer term it appears they have little, if any, effect,” the researchers report.

The researchers also investigate the potential impact of “pay to delay” settlements

on the R&D spending of patent-holding firms. They compare the behavior of firms involved in three U.S. Circuit Court decisions which allowed settlements with the behavior of firms in two other decisions in which the judge ruled against the settlements. Manufacturers whose settlements were allowed boosted their R&D spend-

ing 0.5 percent, and 1.0 percent in the next year and subsequent years. Under the researchers’ preferred assumptions about the link between R&D spending and future drug development, which they acknowledge are open to disagreement, they calculate that the elimination of settlements would slow the development of new drugs by less than one drug over a period of 25 years.

— Laurent Belsie



baseline of 19 percent entry without a challenge.

If, however, the patent-holder challenges the action with a lawsuit and the parties settle, the challenge is associated with essentially no immediate increase in generic entry. And when the suit-and-counter-suit result is resolved by a settlement agreement, generic entry may be delayed by as long as five years.

“While this does not necessarily

Volatility and the Gains from Trade

Trade between countries has steadily increased in recent decades. This has allowed producers to specialize and scale up, increasing average productivity and raising incomes in many places.

However, it has also subjected producers to price fluctuations that are unrelated to local conditions, and potentially increased the volatility of their earnings.

In **Volatility and the Gains from Trade** (NBER Working Paper No. 22276), **Treb Allen** and **David Atkin** explore the effect of trade liberalization on the income volatility of farmers in rural India. They first demonstrate that expanding trade raises the earnings volatility. They then ask whether this effect magnifies or attenuates the gains from trade, and they study how Indian farmers react to the higher volatility of their earnings.

Using 40 years of agricultural data, from 1970 to 2009, the researchers show that improvements in the nation's highway system weakened the relationship between local rainfall and the market prices for local agricultural products. In the 1970s, when travel to India's major cities was more difficult, many Indian farmers were essentially isolated from global

markets. Accordingly, high yields during rainy years typically meant that competitors also experienced high yields, putting down-

ward pressure on local prices. High quantities coincided with low prices, and vice versa, which had a stabilizing effect on incomes. Following improvements to highways, farmers competed with more-distant producers, and local conditions played a smaller role

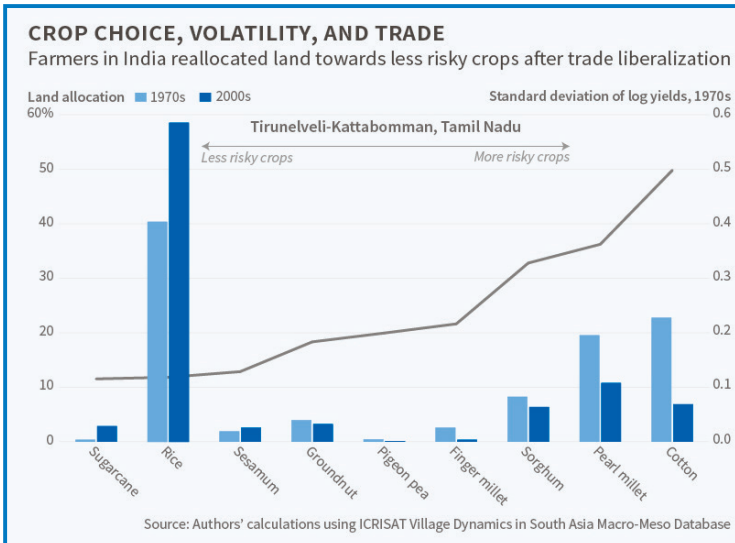
with increased earnings volatility after highway infrastructure improvements opened their regions to trade, Indian farmers changed their crop allocation and moved away from riskier, more rainfall-dependent, crops. This reallocation occurred less in districts with better access to banks, suggesting farmers self-insure against income volatility to some extent when given access to credit.

The researchers find that when faced

with increased earnings volatility after highway infrastructure improvements opened their regions to trade, Indian farmers changed their crop allocation and moved away from riskier, more rainfall-dependent, crops. This reallocation occurred less in districts with better access to banks, suggesting farmers self-insure against income volatility to some extent when given access to credit.

The researchers model the farmers' choice of crops as a portfolio decision, and they find that had the farmers not reallocated their crops, the volatility effects of trade would have offset about 15 percent of the total gains from trade. However, by shifting to less risky crops, farmers were able to completely avoid this reduction in welfare, raising their total gains from trade by about 15 percent. The extent of such gains varied by location, however. The gains were smallest in districts where the most productive crops were also the most risky.

— Andrew Whitten



in determining the prices they received for their output. This meant that years with high rainfall were especially good for farmers, but it also meant years with low rainfall were especially bad, as prices did not rise to compensate. This increase in earnings volatility is particularly significant in rural India,

NBER

The National Bureau of Economic Research is a private nonprofit research organization founded in 1920 and devoted to objective quantitative analysis of the American economy. Its officers are:

James M. Poterba—President & Chief Executive Officer
Martin B. Zimmerman—Chairman
Karen N. Horn—Vice Chairman

The NBER Digest summarizes selected Working Papers recently produced as part of the Bureau's program of research. Working Papers are intended to make preliminary research results available to economists in the hope of encouraging discussion and suggestions for revision. The Digest is issued for similar informational purposes and to stimulate discussion of Working Papers before their final publication. Neither the Working Papers nor the Digest has been reviewed by the Board of Directors of the NBER.

The Digest is not copyrighted and may be reproduced freely with appropriate attribution of source. Please provide the NBER's Public Information Department with copies of anything reproduced.

Individual copies of the NBER Working Papers summarized here (and others) are available free of charge to Corporate Associates and to the affiliates of other organizations, such as universities and colleges, with subscriptions. For all others, there is a charge of \$5.00 per downloaded paper or \$10.00 per hard copy paper. Outside of the United States, add \$10.00 per order for postage and handling. Advance payment is required on all orders. To order, call the Publications Department at (617) 868-3900 or visit www.nber.org/papers. Please have the Working Paper Number(s) ready.

Subscriptions to the full NBER Working Paper series include all 1000 or more papers issued each year. Subscriptions are free to Corporate

Associates. For others within the United States, the standard rate for a full subscription is \$9350; for academic libraries and faculty members, \$7480. Higher rates apply for foreign orders. The on-line standard rate for a full subscription is \$2250 and the on-line academic rate is \$1040.

Partial Working Paper subscriptions, delineated by program, are also available. For further information, see our Web site, or please write: National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398.

Requests for Digest subscriptions, changes of address, and cancellations should be sent to Digest, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398 (please include the current mailing label), or by sending email to subs@nber.org. Print copies of the Digest are only mailed to subscribers in the U.S. and Canada; those in other nations may request electronic subscriptions at www.nber.org/digestsubscribe/.