CoBANK™

OUTLOOK Economic Data and Commentary

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U.S. Food Safety: Perception vs. Reality

The recent listeria outbreak traced to Colorado cantaloupes, responsible for 28 deaths and an estimated 100 illnesses, is just the latest in a string of high-profile food contamination incidents making their way onto plates and into the headlines.

The past few years have delivered salmonella-laced turkey from Arkansas, tainted baby food from China, and deadly peanut butter from Georgia, to name a few. To critics of the modern American food network, these cases reflect an over-industrialized system that values mass-production and profits over health and safety. Author Michael Pollan, in his influential 2006 book, *The Omnivore's Dilemma*, implicated modern agriculture in what he called a "prevalence of food poisoning in America."

That sort of language draws the ire of economic and agricultural historian Peter A. Coclanis, Albert Ray Newsome Distinguished Professor at the University of North Carolina, who argues that food poisoning in the United States today is actually at an all-time low, both by historical standards and in relation to the rest of the world.

Considering the number of meals Americans consume each day, the vast array of contaminants vying to get into their food, and the complex steps required to get food from farm to stores shelves to homes, the amazing thing is not how many tragedies occur, he argues, but how few.

For that, Coclanis, former president of the Agricultural Historical Society and current director of UNC's Global Research Institute, credits what he describes as the ingenuity, efficiency, and safety of the American food system.

OUTLOOK: How safe is the U.S. food supply?

Peter Coclanis: It's extremely safe. Each year, about 3,000 people in the United States die from food- or water-related contamination. That's about eight people a day, which sounds like a lot, until you consider the statistics. There are 311 million Americans. Figuring three meals a day, plus additional meals or snacks, that adds up very conservatively to around

> The chance of dying from any individual meal is one in 125 million. The system isn't perfect, and there are always ways to improve. But those are pretty good odds.

1 billion "eating events" each day – times when it's possible for someone to become contaminated. That means your chance of dying from any individual meal is one in 125 million – not even factoring all of the water and other beverages people consume between meals. The system isn't perfect, and there are always ways to improve. But those are pretty good odds.

OUTLOOK: What about people who don't die, but become sick?

PC: Lots of Americans get very mild symptomatic or non-symptomatic cases of food contamination. The Centers for Disease Control estimates 50 million cases a year, or about one in six Americans who become contaminated, often without knowing it. People will say they have a "bug." But there are so many germs in the world – bacteria, viruses, parasites, molds, and toxins of one type or another – and so many ways to contract them, that pinning down the exact culprits can be extremely difficult. The fact is that most of us get something like this periodically and in the vast majority of cases we recover quickly and move on. On rare occasions (128,000 cases a year or about 350 per day) someone is hospitalized. And on extremely rare occasions someone dies.

Usually, hospitalizations and deaths occur in people under the age of two or over 75, or in others with compromised immune systems.

OUTLOOK: Yet it seems we're always learning about new, deadly outbreaks, such as the listeria-tainted cantaloupes.

PC: Listeria has been with us forever. The problem with this particular bacterium is it's not killed by cold, so refrigeration won't protect you. Without discounting the very real tragedy of those individual deaths, consider the fact that this is the single deadliest food outbreak in 13 years in the United States, and it's killed 25 people so far, most of them quite elderly and thus already compromised. Think of the millions of Americans who eat cantaloupe each year without getting sick. It's important for authorities to investigate practices at the Colorado farm where the outbreak originated, as they are. But it's also important to keep things in perspective and not overreact.

OUTLOOK: You haven't stopped eating cantaloupe?

PC: I ate some this morning. I assumed it wasn't from that farm in Colorado, but I didn't check.

About this article

Economist and food historian Peter A. Coclanis is the Albert Ray Newsome Distinguished Professor at the University of North Carolina. He is also the former president of the Agricultural Historical Society and current director of UNC's Global Research Institute. Coclanis is the author of numerous works in U.S. and international economic history.

OUTLOOK: Why do these cases get such intense news coverage?

PC: For the same reason that airline accidents do, because they're so rare. The fact that we get worked up is, if anything, a testament to the quotidian safety of our system. I find comfort in math. Considering the statistics on airline fatalities, I feel very safe in the hands of a pilot on a long transcontinental flight. I find it soothing.

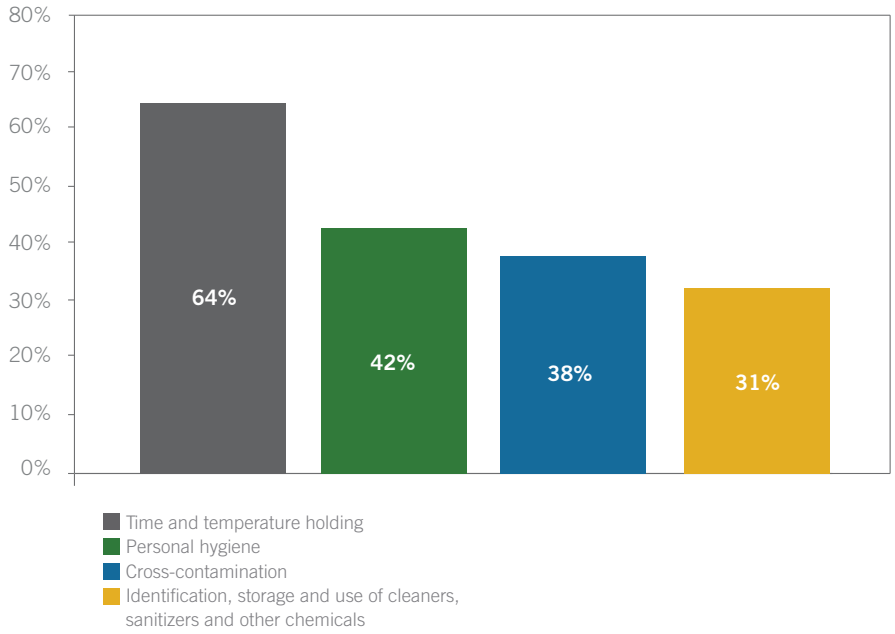
OUTLOOK: As a food historian, can you compare food safety today versus at other periods in the nation's past?

PC: In the 19th century, you took a big risk every time you stopped somewhere on a trip and drank the water or ate the food. They didn't separate meats and vegetables during preparation, food wasn't chilled, and there weren't good storage or preservation techniques. They didn't know the importance of washing food and hands. If you became seriously ill, there were no effective medications to help your immune system fight the infection. Infections were seen as natural. People died, and the cause would often simply be recorded as "fever."

Beyond these localized cases that could happen anytime and anywhere, there were devastating food- and water-borne diseases such as cholera, which killed millions around the world, including in the United States. Major cholera outbreaks occurred in 1832, 1849 and 1866. The 1832 outbreak started in India and spread during the great wave of globalization during the 19th century. Cholera is caused by a fecal bacterium spread through contaminated water, as well as undercooked food prepared by people who, to put it delicately, use the bathroom and don't wash their hands. The main problem in big cities was that bacteria would get into the water supply and spread very quickly. And they had no idea how to treat rapid dehydration from diarrhea, which caused the deaths.

Another big killer was tuberculosis. Up through the early 20th century, tens of thousands of Americans died each year from bovine tuberculosis that

KEY DRIVERS OF FOOD-BORNE ILLNESS



Source: FDA Report on the Occurence of Food-borne Illness Risk Factors in Selected Institutional Foodservice, Restuarant and Retail Food Facility Types (2004).

> It's not that these germs aren't nasty, dangerous and still around. They are. The point is that, despite occasional and regrettable lapses, we do such a good job of containing them.

leapt to humans who consumed unpasteurized, contaminated milk and dairy products. Essentially, the U.S. had the same disease profile in the 19th and early 20th centuries that a developing nation has today.

OUTLOOK: What happened to those diseases?

PC: By the late 19th century, we had a better understanding of cholera and how it spreads. That led to the development of modern sewage and water treatment, which effectively eliminated the disease in the developed world. The last major outbreak in the U.S. was in 1911, though cholera remains a problem in developing countries. Pasteurization, introduced state by state through the 1920s, along with better dairy sanitation and milk-handling techniques, pretty much did away with TB from milk by 1940. Lately, it's coming back a little, among immigrant groups consuming raw milk products from Central America and Mexico, and among other Americans who see raw milk as a more "natural" choice.

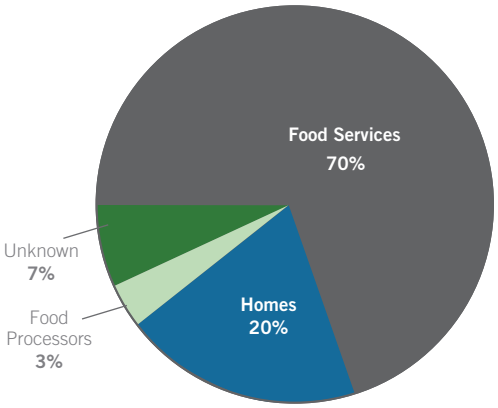
OUTLOOK: Given those successes, what contaminants remain on the "Most Wanted" list?

PC: The really bad ones (there are 30 or so) include salmonella, which can occur in eggs, poultry, and meat of various types; E. coli in ground beef, raw milk, and leafy greens; and campylobacter, which can contaminate chicken and eggs. Also, there are noroviruses that can be found in prepared foods such as sandwiches and salads. Listeria, which we already mentioned, occurs in produce, deli meats, and unpasteurized cheeses. Hepatitis A, for which there's a vaccine, occurs in undercooked shellfish. Then there's shigella, another fecal bacterium, which can cause severe and bloody diarrhea; and botulism, which is a bacterium found in the soil. There's also a pretty bad parasite called toxoplasma that's found in meats. I could go on. If you want to scare people with this stuff, it's possible.

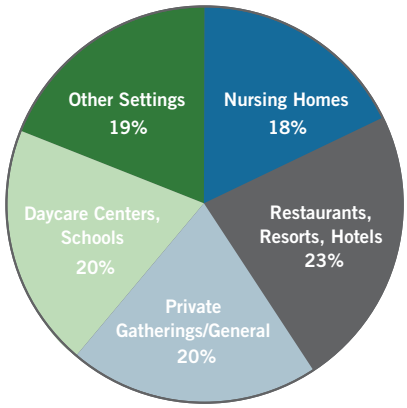
OUTLOOK: Mission accomplished. Suddenly, I don't feel so safe.

PC: It's not that these germs aren't nasty, dangerous and still around. They are. The point is that, despite occasional and regrettable lapses, we do such a good job of containing them. A lot of that has to do with refrigeration and freezing, better packaging and handling, and higher cleanliness standards throughout the supply chain. And, once the food finds its way into homes

SOURCES OF FOOD-BORNE ILLNESS OUTBREAKS



WHERE OUTBREAKS OCCURRED IN FOOD SERVICES



Source: Centers for Disease Control and Prevention

and restaurants, there's better education about temperature control, "use-by" dates, separating meats and vegetables during preparation, washing hands and utensils, and so forth. When a serious outbreak does happen, the government does a pretty good job of surveillance, identifying and tracking it. And the health care system is sufficiently robust to respond in a vigorous way. Since the late 1930s and early 1940s we've had a growing number of effective drugs such as penicillin and sulfa drugs to help knock out the most serious cases.

Living our urban lives, we sometimes assume that we've conquered nature and become immune to natural forces that have beset people for millennia. To the extent that that feeling is justified, it's a testament to the quality of our public health and medical systems, the regulatory system, and processes in place in farms and food processing and distribution centers.

OUTLOOK: But critics contend that processing and distribution centers are the whole problem, and that the solution lies in slower, more natural rhythms of locally grown, organic food.

PC: The anti-industrial thing to me is largely an elitist snobbery, a class marker for the consumer's supposed discernment. Organic farms and locally grown foods have their place (at most, 1 percent of the total food market in the U.S.) but those who say we should all buy eggs from small farms at $8 a dozen are delusionary. Robert Paarlberg, an agriculture expert at Wellesley College who writes on the politics of food, points out that if you really think our nation's food supply should be local, organic, and slow, what you've just described is most of Africa. In fact, to feed its hungry, Africa needs to become more industrial. The industrial food system in the United States feeds Americans at 8 to 9 percent of their annual income. Add 3 to 4 percent for restaurant meals and you've got 11 to 13 percent of income spent on food.

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That's an incredibly low figure by world and historical standards – and one we've managed to maintain even through the depths of this stagnant economy. In less developed countries, the figure can be as high as 70 percent. Even in other developed countries, people spend up to 25 to 30 percent. Our food system is very low-cost, and it's good, and it's safe.

OUTLOOK: Another argument in favor of local food holds that long-distance transportation taxes the environment.

PC: People wring their hands over the environmental impact of "food miles." I beg to differ. If you live in a region with seasonal weather and try to eat only local foods, as some people suggest, you're either going to have a monotonous diet for half the year or eat fresh produce grown in greenhouses. There's been a similar movement by some environmentalists encouraging locally grown greenhouse flowers instead of flying them in from places like Kenya (to Europe) and Colombia (to the United States). But studies have shown that there are greater environmental costs involved in growing flowers in greenhouses in the winter than just growing them in warm climates and flying them in.

OUTLOOK: What about so-called factory farms? Critics draw an explicit or implicit connection between what they see as inhumane treatment of animals and food safety.

PC: There are good reasons why, for hundreds of years, terms such as "abattoir" and "slaughterhouse" have been metaphors for something that's not pleasant. It doesn't matter whether it takes place in a 21st-century Iowa meat packing plant, or in the early 20th-century Chicago of Upton Sinclair's *The Jungle,* or on a farm in upstate New York in the 19th century. It's the same job. I wonder if critics of factory farms have spent much time on traditional farms. If so, they might welcome the cleanliness and the protocols of a large factory farm.

OUTLOOK: Another side of modern agriculture involves bioengineering and genetic modification. Is this Orwellian manipulation or the answer to our food needs?

PC: Whenever you improve a crop or breed a better pig, you are manipulating genes. Bioengineering has been going on at least since the

> More extensive use of genetically modified organisms could reduce the amount of water needed, further reduce use of herbicides and pesticides, and create foods that are richer in nutrition.

ancient Babylonians developed and improved different varieties of wheat. Until now, it's all been within one species or between closely matched species. The difference today is in our understanding of exactly what's going on, and our ability to move genes across species.

Genetically modified organisms (GMOs) are very prominent in certain crops – cotton, corn, soybeans and canola. The overwhelming evidence is that these modified plants, at least those on the market right now, pose no threats to human health. And there's no evidence that they pose special environmental problems. On the other hand, there's plenty of evidence that they bring significant advantages to farmers, who use fewer herbicides and pesticides because those engineered plants are more resistant to attack. And GMOs may be our best chance to meet the needs of a growing world population.

OUTLOOK: How so?

PC: By the middle of the 21st century we're going to have 9 or 9.5 billion people in the world, versus 7 billion today. With incomes rising globally, people want different foods, including more dairy and meat. The only way I see this happening is through more extensive use of genetically modified organisms, which could reduce the amount of water needed per unit of output, further reduce the amount of herbicides and pesticides, and create foods that are richer in nutrition.

OUTLOOK: You mentioned at the outset that any system has room for improvement. What could the U.S. food system do better in terms of safety?

PC: There's not likely to be a magic bullet because we're already so safe. When the odds of dying from a bad meal are already one in 125 million, it's harder and harder to move the needle. One significant step would be wider use of food irradiation, which uses radiant energy to destroy most microorganisms. Irradiation has been around for a long time, and poses no known health risks. In the 1990s the Food and Drug Administration said irradiation was fine for meats and vegetables. But people are afraid of the word "radiation," which is the main reason the process is still in only limited use. There are some other promising techniques, such as high pressure processing, and pulsed electric field processing, to kill germs.

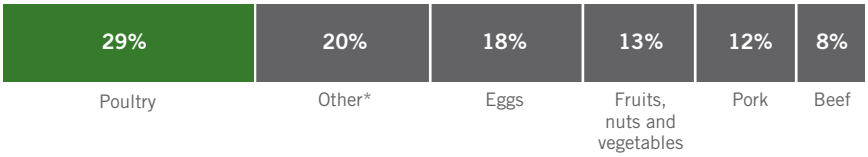
In terms of supply and distribution, there are still improvements to be made in streamlining what's known as the "cold chain" – making sure food stays properly cooled through every step from production to shipping to storage and sale.

And, of course, one of the most important steps has little to do with new technology. It's about doubling and redoubling our vigilance in food handling and cleanliness practices that are already known to be effective. There are always going to be some people who try to cut corners, and then there's simple carelessness. Often, when there's an outbreak and investigators finally get to the bottom of it, it turns out one person somewhere in the chain didn't wash his hands.

SALMONELLA OUTBREAKS

Poultry is the most prominent cause of salmonella sickness compared to other foods.

Foods associated with salmonella outbreaks, 2004-2008



NOTABLE OUTBREAKS

YEAR	SOURCE	REASON WHY	DETAILS
2011	**Ground turkey**	**Manufacturing**	**50,000 lbs recalled following illness in 10 states**
2010	Eggs	Production	Chicken and feed contamination, 500 million eggs recalled
2009	Peanuts	Manufacturing	Processing plant contamination, sickness in 46 states
2008	Restaurants	Preparation and consumption	Poor kitchen practices lead to cross-contamination in foods
2007	Frozen pot-pies	Preparation and consumption	Undercooked pies sicken people in 35 states, Puerto Rico, and the Caribbean
1994	Ice Cream	Distribution and delivery	Trucks hauling ice cream after raw eggs sicken 200,000

*Sprouts, leafy greens, roots, fish, grains-beans, oil-sugar and dairy

Source: Centers for Disease Control and Prevention

OUTLOOK: How good is our regulatory system?

PC: Considering the vastness and complexity of our food supply network, I'd say the system works pretty well. The proof is in the numbers. There are still weak points in any system. The fragmented authority of food regulation internationally is certainly one of those pressure points. For example, there have been some well-publicized incidents involving melamine in imported baby formula and pet food from China. Other countries don't always have the standards we do regarding pesticides and residues that could be on the food – and that makes it difficult to regulate when a single processed item may contain ingredients from several countries.

Overall, though, the desire to gain access to U.S. and other developed markets has prompted exporting nations to raise their standards markedly. The market is a powerful force, and the supply chain demands regularity and order and protocols that will meet U.S. standards. With globalization and with circulation of ideas, personnel, technology and practices around the world, we are in a much better position than we were just a few years ago. I was in the Mekong Delta recently and visited a chicken and hog processing

plant that looked at least as modern and well-run as anything I've seen in America. It could have been in Iowa or eastern North Carolina at one of the big integrators. It was an impressive facility with state of the art equipment. Today, everybody has access to the same equipment, and the work forces are increasingly as educated and conscientious as ours.

OUTLOOK: Even as the world becomes more standardized, most frequent travelers to exotic locales have a food poisoning story or two in their past. How about you?

PC: Mine came several years ago when I was traveling in a remote part of Western Burma, alone. I was visiting temple ruins and was about the only person staying at a small hotel during the off-season. They grew to like me after a couple of days and they made me a special breakfast of a kind of pancake, but they used grease from the grill that must have been from the past season. I'm pretty sure it was salmonella I contracted. I was a four-hour boat ride to the nearest town. Fortunately, my wife had packed some of the antibiotic Cipro for me. I didn't even know it was in my bag. After a couple of days I found it and took it and I began to come around. But it was a pretty intense three or four days.

OUTLOOK: What food rules do you follow to avoid repeat scenarios on the road?

PC: As you might imagine, I'm more wary about eating at out-of-the-way hotels during the off-season. Other than that, it's common sense things. I try to make sure a place looks clean and savory. If I'm uncertain of the fruits and vegetables, I'll order something with hot liquid and then dunk them before eating. I use my senses – eyes, ears, nose. I prefer crowds, not just because the place is popular, but because the kitchen's busy and food is less likely to be sitting around. And I ask local people for recommendations. But I don't worry about it too much. I go all over the world and I've been pretty lucky over the last 30 years. I'll eat anywhere.

Interest Rates and Economic Indicators

The interest rate and economic data on this page were updated as of 9/30/11. They are intended to provide rate or cost indications only and are for notional amounts in excess of $5 million except for forward fixed rates.

KEY ECONOMIC INDICATORS

Gross Domestic Product (GDP) measures the change in total output of the U.S. economy. The Consumer Price Index (CPI) is a measure of consumer inflation. The federal funds rate is the rate charged by banks to one another on overnight funds. The target federal funds rate is set by the Federal Reserve as one of the tools of monetary policy. The interest rate on the 10-year U.S. Treasury Note is considered a reflection of the market's view of longer-term macroeconomic performance; the 2-year projection provides a view of more near-term economic performance.

ECONOMIC AND INTEREST RATE PROJECTIONS

Source: Insight Economics, LLC and Blue Chip Economic Indicators

				US Treasury Securities	
2011	**GDP**	**CPI**	**Fed Funds**	**2-year**	**10-year**
Q3	1.90%	2.20%	0.09%	0.30%	2.40%
Q4	2.10%	1.80%	0.10%	0.20%	2.00%
2012	**GDP**	**CPI**	**Funds**	**2-year**	**10-year**
Q1	2.10%	2.10%	0.10%	0.20%	2.00%
Q2	2.40%	1.90%	0.10%	0.20%	2.10%
Q3	2.60%	2.20%	0.13%	0.30%	2.10%

PROJECTIONS OF FUTURE INTEREST RATES

The table below reflects current market expectations about interest rates at given points in the future. Implied forward rates are the most commonly used measure of the outlook for interest rates. The forward rates listed are derived from the current interest rate curve using a mathematical formula to project future interest rate levels.

IMPLIED FORWARD SWAP RATES

Years Forward	3-month LIBOR	1-year Swap	3-year Swap	5-year Swap	7-year Swap	10-year Swap
Today	0.37%	0.51%	0.73%	1.29%	1.77%	2.22%
0.25	0.52%	0.55%	0.82%	1.38%	1.85%	2.28%
0.50	0.56%	0.56%	0.92%	1.52%	1.95%	2.39%
0.75	0.57%	0.57%	1.04%	1.64%	2.06%	2.46%
1.00	0.56%	0.60%	1.14%	1.76%	2.15%	2.52%
1.50	0.60%	0.76%	1.47%	2.02%	2.37%	2.70%
2.00	0.87%	1.06%	1.76%	2.26%	2.56%	2.83%
2.50	1.21%	1.43%	2.08%	2.50%	2.74%	2.98%
3.00	1.56%	1.80%	2.39%	2.73%	2.92%	3.12%
4.00	2.23%	2.47%	2.87%	3.06%	3.19%	3.32%
5.00	2.67%	2.86%	3.15%	3.27%	3.37%	3.43%

HEDGING THE COST OF FUTURE LOANS

A forward fixed rate is a fixed loan rate on a specified balance that can be drawn on or before a predetermined future date. The table below lists the additional cost incurred today to fix a loan at a future date.

FORWARD FIXED RATES

Cost of Forward Funds

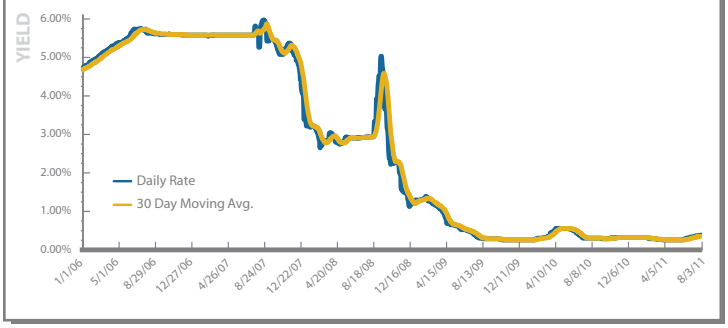
Forward Period (Days)	Average Life of Loan			
	2-yr	3-yr	5-yr	10-yr
30	5	6	8	6
90	9	13	18	13
180	15	24	33	24
365	38	53	67	46

Costs are stated in basis points per year.

SHORT-TERM INTEREST RATES

This graph depicts the recent history of the cost to fund floating rate loans. Three-month LIBOR is the most commonly used index for short-term financing.

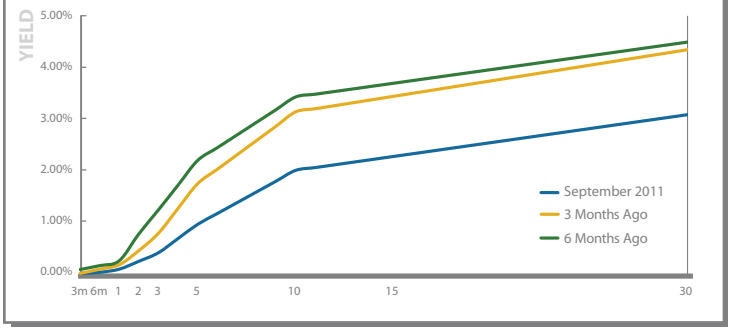
3-MONTH LIBOR



RELATION OF INTEREST RATE TO MATURITY

The yield curve is the relation between the cost of borrowing and the time to maturity of debt for a given borrower in a given currency. Typically, interest rates on long-term securities are higher than rates on short-term securities. Long-term securities generally require a risk premium for inflation uncertainty, for liquidity, and for potential default risk.

TREASURY YIELD CURVE



CoBank Announces Board Election Results

Dobrinski, Fritz, Harris Re-Elected to Four-Year Terms

CoBank, a leading cooperative bank serving agribusinesses and rural infrastructure providers throughout the United States, recently announced results of shareholder elections for the bank's 2012 Board of Directors.

Stockholders in the bank's Central Region re-elected Everett Dobrinski, who has been a bank director since 1999 and chairman of the board since 2008. He is the owner and operator of Dobrinski Farm, a cereal grain and oilseed farm in Makoti, North Dakota. Dobrinski is also the board chairman of Verendrye Electric Cooperative. In addition, he serves on the board of the Farm Credit Council, the trade association for the Farm Credit System.

In the West Region, Mary E. Fritz was re-elected to the seat she has held since 2003. Fritz is the owner and operator of Quarter Circle JF Ranch, Inc., a dry land grain and cow/calf operation in Chester, Montana. She has served as the board's second vice chairman since 2008. She is the vice chairman of the Farm Credit Council, and formerly served as board chairman and director for Northwest Farm Credit Services, one of CoBank's affiliated Farm Credit associations.

In the East Region, William H. Harris was re-elected to the seat he has held since 2001. Harris is the owner and operator of Harris Farms, a cash crop farming operation in LeRoy, New York. Harris is also a partner in HR&W Harvesting, a processing vegetable farm, and president of Eatwell Farms, Inc. He formerly served as a director of Farm Credit of Western New York, a CoBank affiliated association that is now part of Farm Credit East.

Dobrinski, Fritz and Harris will all serve four-year terms that begin in January 2012.

As previously announced, CoBank is planning to merge with U.S. AgBank, another bank in the Farm Credit System, on January 1, 2012. Under the governance plan approved by the stockholders of both organizations, the CoBank and U.S. AgBank boards will be temporarily combined on the merger effective date. Following a one-year transition period, the size of the combined bank's board will be reduced to 24 elected directors from six geographical regions, along with a number of appointed directors.

The combined bank will do business under the CoBank name and remain headquartered in Colorado, with Dobrinski continuing as chairman of the board and U.S. AgBank Chairman John Eisenhut assuming the role of first vice chairman.

About CoBank

CoBank is a $66 billion cooperative bank serving vital industries across rural America. The bank provides loans, leases, export financing and other financial services to agribusinesses and rural power, water and communications providers in all 50 states. CoBank is a member of the Farm Credit System, a nationwide network of banks and retail lending associations chartered to support the borrowing needs of U.S. agriculture and the nation's rural economy. In addition to serving its direct borrowers, the bank also provides wholesale loans and other financial services to affiliated Farm Credit associations and other partners across the country. Headquartered outside Denver, Colorado, CoBank serves customers from regional banking centers across the U.S. and also maintains an international representative office in Singapore. For more information about CoBank, visit the bank's web site at www.cobank.com.