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A Permanent Slowdown in Productivity Growth?

Has the golden age of American productivity already passed us by? That's the worrisome question behind Robert Gordon's *The Rise and Fall of American Growth*, which promises to be one of the most talked-about books of the year. The New York Times calls it "an essential read for all economists, who are unanimously floored by its boldness and scope even if they don't agree with its conclusions."

Gordon's thesis is that the century from 1870 to 1970, with its technological advancements and economic upheavals, produced a level of economic growth that America will never again be able to match. He painstakingly explains what caused the American economy to transform itself through those decades, from the coming of the electric light to the necessary efficiencies of World War II, and examines why it's slowed in recent years.

As an economic history of the United States, Gordon's book is essential reading for anyone who wonders how America became the world's powerhouse. As an economic forecast, it is much more sobering. Although Gordon concludes that we'll never see another "great leap forward" like that one, he does offer some prescriptions for increasing American productivity in today's society. *OUTLOOK* talked with Dr. Gordon from his office at Northwestern University about how America changed in that century, why the Internet hasn't caused the same type of transformation, and what we can do now to enhance our productivity in the future.

OUTLOOK: The central thesis of your book is that the century from 1870 to 1970 brought a kind of growth to America that we will never see again. Why is it so unlikely that we will ever have another great leap forward like that?

Robert Gordon: Most of these innovations were things that could only happen once. In 1870 every house was completely isolated, but by 1940 virtually every urban house was connected five ways to the outside world: with electricity, with gas, with telephone, with running water and with sewage removal. Once the houses were hooked up, there was no

This Month's Expert

Robert Gordon is the Stanley G. Harris Professor in the Social Sciences at Northwestern University, where he has taught economics since 1973. His latest book, *The Rise and Fall of American Growth*, is a New York Times best-seller; his previous books include *Productivity Growth, Inflation and Unemployment* and *Macroeconomics*.

Dr. Gordon earned bachelor's degrees from both Harvard and Oxford University, and his Ph.D. from MIT. He is a research associate of the National Bureau of Economic Research and a member of the NBER's Business Cycle Dating Committee, a Research Fellow of the Centre for Economic Policy Research (London) and the Observatoire Français des Conjonctures Economiques (OFCE, Paris), and an economic adviser to the Bureau of Economic Analysis. Dr. Gordon was included in the 2013 Bloomberg list of the nation's most influential thinkers.

more innovation to do in that direction, except to extend those benefits to the small towns and farms. Our speed of travel went from the very slow railroads of 1870, which went 20 or 25 miles per hour, to the Boeing 707 of 1958, which went at 80 percent of the speed of sound, and we're not flying any faster now than we were in 1958.

Since 1970, we have had numerous advances in the types of food available, such as the availability of off-season produce and various kinds of prepared foods in upscale supermarkets. But nothing can compare with the arrival of refrigeration, which allowed meat to be kept safely instead of spoiling, or the Pure Food and Drug Act of 1906, which finally stopped the contamination of milk. The kitchen was pretty much fully equipped by 1970, with everyone having refrigerators and stoves, and most people having dishwashers and garbage disposals. The only invention that happened after 1970 of any importance was the microwave oven. But that's just one small invention compared to all the changes that had taken place in the kitchen over the previous 70 years.

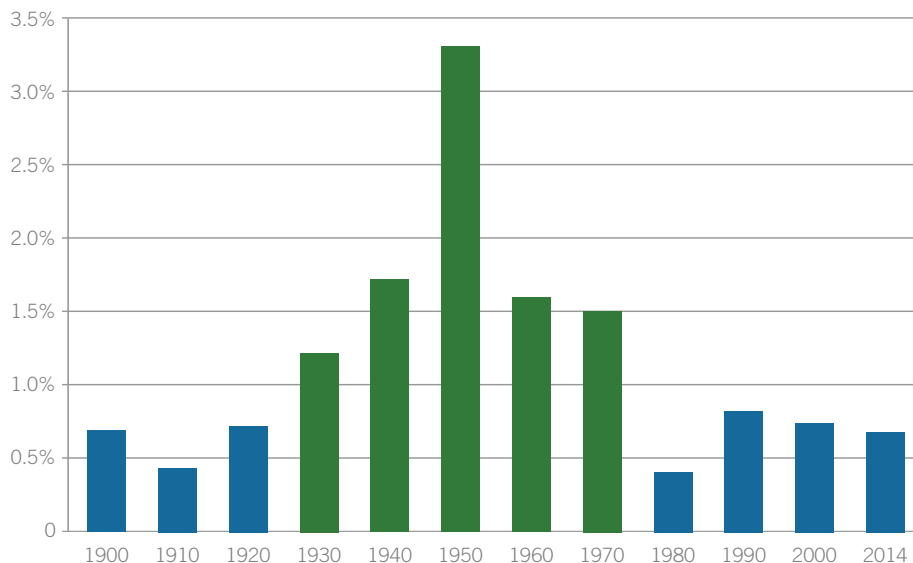
As you tick down these innovations, you reach perhaps the most important of all: the conquest of infectious diseases and the reduction of infant mortality from 22 percent to 1 percent in the period from 1890 to 1950. Once you get infant mortality down to almost zero, there's no further progress to be made. So it's in the very nature of these inventions spanning the whole variety of human existence that they could only happen once. Further innovations were refinements.

OUTLOOK: Is there anything that could have happened beginning in the 1970s that could have sustained that period of growth?

RG: A lot did happen. We had the digital revolution, sometimes called the third industrial revolution, taking the form of technology and computers. We went from very low-powered, clumsy mainframes that needed a whole separate room to maintain them at a proper temperature to mini computers, then personal computers. It took a good 30 years from 1970 on to revolutionize the office, which in 1970 was based on paper, typewriters and file cabinets. Gradually, we got rid of the typewriters through personal computers with word processing, and spreadsheet software allowed us to get rid of calculating machines on the desk. We then had the marriage of communications with computers that we call the internet, with search engines and the beginnings of e-commerce in the late 1990s.

ANNUAL GROWTH RATE OF TOTAL FACTOR PRODUCTIVITY

For Each Decade from 1900 to 2014



Total Factor Productivity is economic growth minus the effects of educational attainment and capital deepening.

The average annual growth rate is over the ten years prior to the year shown. The bar labeled 2014 shows the average annual growth rate for 2001-2014.

Source: *The Rise and Fall of American Growth*, by Robert Gordon.

OUTLOOK: *There's a quote in your book: "You can see the computer age everywhere but in the productivity statistics." Why is that?*

RG: The reason that computers didn't have a bigger impact on the economy and productivity is that they affected a relatively narrow sphere of what human beings do. But progress was considerable in the 1980s when the first personal computers came in. With spreadsheet software, you no longer had to have banks of secretaries retyping manuscripts, because you could do it on the screen. For some reason that nobody understands, the productivity payoff from this revolution was concentrated

in one decade, from 1995 to 2004. That's when we see a distinct revival in productivity growth – not to the full rate that characterized the period between 1920 and 1970, but there was a distinct revival. Why it happened in that decade, and was not more spread out through the 1980s and 1990s, remains a mystery.

OUTLOOK: *You talk about the great economic leap forward from 1928-1950, even though most of the technological advances took place earlier than that. What made that period so fertile?*

RG: Back in 1990, an economist named Paul David analyzed the advent of electricity, and came up with a number of reasons why the full effect of electric machinery did not really come to fruition until the 1920s, even though the first power plant was in 1882. There was a long period over which electric service became more and more reliable, and they had to invent the machines that were propelled by electricity. The same kind of delay occurred with the internal combustion engine. It took 20 years from 1879 to perfect the transmission of the power to the wheels with things like transmissions. They had to invent new types of brakes – all sort of sub-inventions went into the first motorcars. And then it took the first 30 years of the 20th century for the economy to be fully equipped with motorcars and trucks before they could start doing their wonders on productivity. The number of motorcars went from 4,000 in 1900 up to 26 million by 1930. You had this enormously rapid transition from horses to motor transport, and the benefits that we saw from that fleet of motor vehicles before the 1920s went on to be even more influential in the 1930s and 1940s.

“Since the beginning of 2010, productivity growth has been historically low – the lowest rates ever experienced in a business expansion.

OUTLOOK: *You contend that one positive for the economy during the Depression was that businesses had to learn how to be leaner and more productive.*

RG: There were really two phases of movements toward greater efficiency. One occurred during the Great Depression, when so many people were laid off; when the economy recovered, many businesses discovered that they didn't need as many people as they did earlier. Going along with the 1930s was the effect of World War II. Everybody learned how to produce more efficiently under the high pressure of the wartime economy. With so many men off in the armed forces – a total of 16 million out of a population of 130 million – business firms learned to produce with less labor. Then when the troops came back after 1945, the economy expanded, with a huge increase in the demand for civilian consumer goods – which could now be produced with more efficiency, because of what people had learned during the war about mass production.

OUTLOOK: *Is it possible to learn these kinds of lessons and achieve these leaps in productivity without having to fight a devastating world war to do so?*

RG: No, I think this was a one-time-only event.

OUTLOOK: *Did we have any similar advances in productivity or efficiency during the Great Recession?*

RG: There was a temporary boost to productivity that occurred during 2009, because of what we can interpret in retrospect as an excessive number of layoffs. Companies got rid of more workers than were really necessary, so there was a small upward tick in productivity during the four quarters of 2009. But since the beginning of 2010, productivity growth has been historically low – the lowest rates ever experienced in a business expansion.

“We’re in uncharted territory right now in terms of the slow pace of productivity growth.”

OUTLOOK: *So unlike with the Depression, you don't see any lasting productivity effects from the Great Recession.*

RG: It's worked its way through now. If you look at productivity growth in the last 11 years, since 2004, the end of that temporary revival we had due to the invention and spread of the Internet, we've got growth of barely 1 percent, compared to closer to 3 percent per year for the 50 years from 1920 to 1970. So we're in uncharted territory right now in terms of the slow pace of productivity growth.

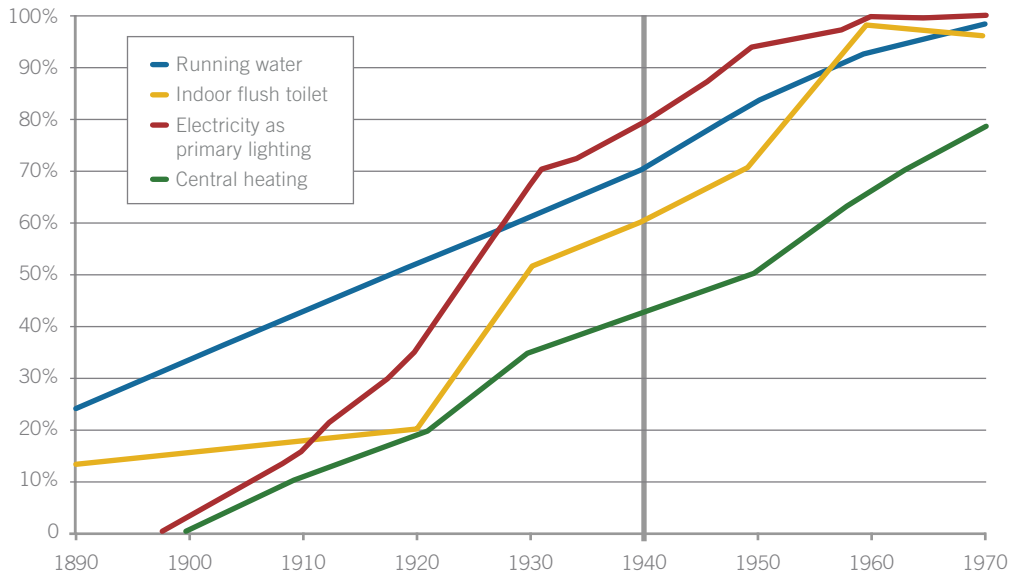
Reducing the unemployment rate has been the major source of our growth in the past six years, as we've gone from a 10 percent unemployment rate at the end of 2009 down to an unemployment rate of 4.9 percent at the end of the most recent month. Most of our growth has been coming from adding workers, and we're close to the point where we're going to run out of the ability to generate growth by adding workers.

OUTLOOK: *One of the remedies you propose to increase productivity is to relieve economic inequality. Why do you consider inequality a drain on growth?*

RG: The effect of rising inequality is to reduce the growth rate of the median income compared to the average income. Over the last 30 years, roughly half of the gains in income have gone to the top 1 percent of the income distribution, leaving the bottom 99 percent to divide up the other half of the pie. When you have an average growth rate of income that includes what is going to the top 1 percent, what's left over for the people in the middle is going to be considerably less. Just to put some numbers on this, my book projects productivity growth for the future at 1.2 percent. Income per person is a smaller growth rate, because hours per person are shrinking, due to baby boom retirement. That brings us down from 1.2 to 0.8 percent for growth in average income per person, as opposed to per hour, which is productivity. Then the inequality increase, which seems to be increasing, would further reduce the growth of median income per person down to 0.4. I take off a final tenth of a percent for the fiscal reckoning that is coming down the road as the Social Security and Medicare trust funds run out of money, and we have a political decision to face as to whether to raise taxes to support them, or to directly reduce the extent of those benefits.

DIFFUSION OF MODERN CONVENIENCES

In Percentage of Households from 1890–1970



Source: The American Economy: Income, Wealth and Want, by Stanley Lebergott

OUTLOOK: *Is there a downside to trying to reduce inequality when it comes to encouraging growth? If you tax the 1 percent at a higher rate, don't you disincent them from taking risks and making investments that could spur innovation and productivity growth?*

RG: There is no evidence that higher taxes on the rich would cause them to take fewer risks or form fewer companies. In fact, the formation of new firms has been declining over the past 15 years despite the major reductions of top-bracket income, dividend, and capital gains tax rates achieved by the Bush administration.

More generally, tax rates were much higher during 1945–80 than in 1980–2015, yet every measure of economic growth was higher during 1945–80, including the growth rate of productivity and the ratio of net investment to the capital stock.

OUTLOOK: *Another headwind to growth that you cite is drug legalization. How would legalizing drug use help productivity?*

RG: We have such a large percentage of minority, particularly African-American, males in the prison system. Many of them are there for nonviolent crimes, particularly drug possession. A switch to drug legalization would save enormous amounts of cost in building and maintaining prisons. In addition to that, we need to have a rethinking of sentencing for nonviolent crimes, and even for some violent crimes. We've got lots of people in prison on 20- and 30-year sentences who are not a threat to society as they age and should be released from prison.

If we can take the share of the population that are now locked up and completely unproductive and get them out there producing things and making things, and using their ideas to be creative, that's bound to increase productivity. It's just the reverse of the retirement of the baby boomers, where we take people from active work and transfer them into retirement, where they're not contributing to the production of output. The U.S prison system is estimated to cost taxpayers \$74 billion a year, using up government revenue that could other be used to address a host of measures.

OUTLOOK: *You also contend that excessive regulation is holding back our economic growth.*

RG: We have excess regulation of occupations, such as the licensing rules for becoming cosmeticians or beauty shop operators. There are all sorts of restrictive licensing rules that are designed to protect the status quo of those who are already in the occupations. We've got land use regulations to drive up the cost of housing in areas on both coasts that, if eliminated or reduced, would reduce the excessive cost of housing. We have a set of regulations that go too far – vast thousands of pages of federal regulations.

OUTLOOK: *If we're not going to have any great leaps forward in growth, where do you see our growth rate headed in the near future?*

RG: My forecast for productivity growth is 1.2 percent per year. If you take the 45 years since 1970 and exclude that one truly productive decade from the mid-1990s to the mid-2000s, productivity growth is something like 1.4 percent. So I'm predicting something fairly close to what we've been experiencing, even though we've had so many innovations over that period.

OUTLOOK: *There is a quote attributed to the man who was U.S. Patent Commissioner back in 1899, who supposedly said that "everything that can be invented has been invented." Is it possible that we are underestimating the potential for another great leap forward just because we can't imagine what will be invented in the future?*

RG: I never said that we have already invented everything. I don't forecast beyond 25 years, and it's possible many wondrous inventions await us 50 or 100 years from now.

But over the next 25 years the outlines of the main inventions are already visible – robots, artificial intelligence, 3-D printing, and driverless vehicles. They are evolving very slowly, and you can look for robots in your daily life and rarely see one unless you work in a manufacturing plant or wholesale warehouse. ■

Interest Rates and Economic Indicators

The interest rate and economic data on this page were updated as of 2/29/16. 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

2016	GDP	CPI	Funds	2-year	10-year
Q1	2.00%	1.20%	0.38%	0.78%	1.87%
Q2	2.50%	2.20%	0.44%	0.98%	2.10%
Q3	2.40%	2.30%	0.48%	1.14%	2.24%
Q4	2.50%	2.30%	0.54%	1.34%	2.39%
2017	GDP	CPI	Funds	2-year	10-year
Q1	2.30%	2.20%	0.59%	1.50%	2.55%

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	0.65%	0.75%	0.94%	1.14%	1.33%	1.57%
0.25	0.75%	0.78%	0.98%	1.18%	1.38%	1.59%
0.50	0.78%	0.82%	1.05%	1.23%	1.43%	1.63%
0.75	0.83%	0.90%	1.09%	1.29%	1.47%	1.68%
1.00	0.87%	0.94%	1.13%	1.33%	1.52%	1.70%
1.50	0.96%	1.04%	1.25%	1.44%	1.61%	1.80%
2.00	1.04%	1.12%	1.33%	1.52%	1.67%	1.85%
2.50	1.15%	1.23%	1.44%	1.61%	1.75%	1.91%
3.00	1.26%	1.34%	1.55%	1.70%	1.83%	1.98%
4.00	1.49%	1.56%	1.72%	1.86%	1.97%	2.09%
5.00	1.65%	1.73%	1.88%	2.01%	2.09%	2.18%

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

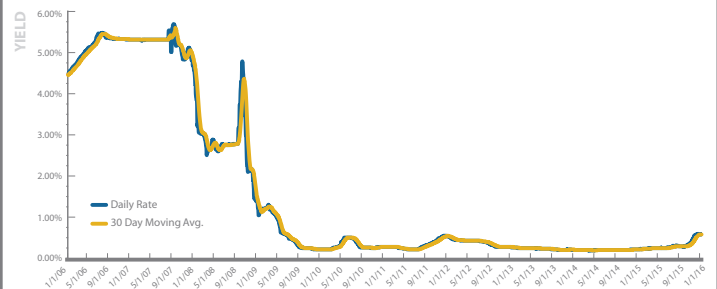
Forward Period (Days)	Average Life of Loan			
	2-yr	3-yr	5-yr	10-yr
30	8	9	8	8
90	12	15	13	13
180	16	22	19	21
365	34	42	35	38

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.

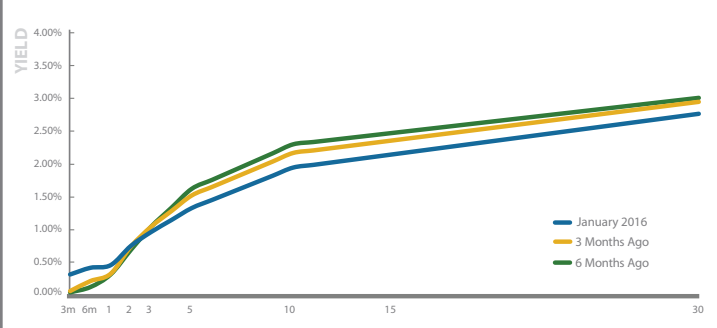
3-MONTH LIBOR



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





About CoBank

CoBank is a \$117 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. The bank also provides wholesale loans and other financial services to affiliated Farm Credit associations serving farmers, ranchers and other rural borrowers in 23 states around the country.

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.

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.

CoBank Reports Full-Year Financial Results for 2015

CoBank has announced financial results for the full year of 2015 as well as the fourth quarter of 2015. The bank reported net income of \$936.7 million for the year, up 4 percent from \$904.3 million in 2014. The increase was driven primarily by higher net interest income and lower net losses on debt extinguishments. Net interest income increased 3 percent to \$1.3 billion, driven by higher average loan volume. Average loan volume rose 8 percent to \$83.1 billion.



Robert B. Engel

"By virtually any financial measure, the year 2015 was one of exceptional performance for CoBank," said Robert B. Engel, CoBank's chief executive officer. "The bank recorded its 16th consecutive year of growth in profitability, an accomplishment unlikely matched by any other financial institution in the world. Loan volume and profitability reached all-time highs and credit quality, liquidity and capital levels remained very strong. Most importantly, we continued to serve our customers and fulfill our mission delivering dependable credit and financial services to vital rural industries."

During the year, the bank saw higher loan volume from customers in a variety of industries and segments, including agricultural cooperatives, food and agribusiness companies, electric distribution cooperatives, power supply customers, and communications service providers. Wholesale lending to affiliated Farm Credit associations also increased due to growth in market share and greater borrowing from their agricultural producer customers. "We are pleased with the robust growth in loan volume we experienced last year despite modest growth in the broader economy," Engel said.

In March, the bank will distribute a record \$514.1 million in total patronage – over half of the bank's earnings for the year – including \$416.0 million in cash and \$98.1 million in common stock. For most customers, that will represent 100 basis points of average qualifying loan volume during the past year, effectively lowering their overall net cost of debt capital from CoBank. "We're delighted with the level of patronage our board has approved this year, the largest in company history," said Engel. "Strong, dependable patronage is an essential part of the value proposition we offer to our customers and an important benefit of doing business with CoBank."

*David P. Burlage*

Credit quality in CoBank's loan portfolio continued to be very strong. The bank's allowance for credit losses totaled \$601.6 million at year-end, or 1.36 percent of non-guaranteed loans when loans to Farm Credit associations are excluded. "We continue to benefit from the strong credit profile of the rural industries we serve," said David P. Burlage, chief financial officer. "As always, credit quality can be impacted by market conditions in the rural economy, and it's possible we will see deterioration from today's levels as a result of lower commodity prices and other challenges facing our customers. That said, we are pleased with our overall credit quality and confident in the bank's risk-bearing capacity and continued ability to meet the borrowing needs of its customers."

For the fourth quarter of 2015, average loan volume increased 12 percent, to \$87.2 billion as compared to the fourth quarter of 2014. Net income for the quarter was \$236.3 million, an increase of 10 percent from \$215.4 million in the same period of 2014. Net interest income also increased 7 percent, to \$333.5 million. CoBank recorded no provision for loan losses during the fourth quarter of 2015, compared to a \$10.0 million provision in the prior-year period.

Engel noted that despite CoBank's strong performance in 2015, the bank continues to face a number of challenges, including intense competition from other banks and lenders for the business of its customers, the need for significant investment in people, processes and technologies to serve the needs of customers, a flatter yield curve, and continued low interest rates that negatively impact returns on invested capital.

"In spite of these headwinds, our cooperative structure ensures we remain aligned with and focused on the needs of our customers – as both customers and shareholders – and on building the financial and operational capacity of the bank for the long term," Engel said. "We are grateful for the enormous trust our customers place in CoBank and are deeply thankful that they choose us to serve as their financial partner." ■