2015 ANNUAL REPORT

An Overview of Our 2015 Annual Report

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John Williams, president and chief executive officer, and Mark Gould, first vice president, welcome you to the San Francisco Fed's 2015 annual report, "What We've Learned…and why it matters" (video, 3:09).

In our 2015 annual report, *What We've Learned…and why it matters*, we reflect on the Federal Reserve Bank of San Francisco's efforts to create a growing, sustainable economy for everyone. The report looks across teams and disciplines, from economic research to human resources, shedding light on various points of view and approaches to our work. You'll see the faces and hear the voices of San Francisco Fed employees from across functions—curious people who are committed to learning and to public service. It's an honest look back at what we've learned and why it matters.

TRANSCRIPT

John Williams:	Annual reports are often dense and tedious documents that attempt to capture a moment in time. They're commonly used to take stock of an institution's progress and tend to report

exclusively about good news. We're proud to say there are a lot of good things happening at the San Francisco Fed.

Mark Gould: But we're not taking that approach this year. Instead, we're offering a variety of media content to capture how the Bank is developing as we collectively work to fulfill our public mission. Of course, we're going to highlight some of our successes. But it's also important to be self-reflective and ask the question, "What have we learned, and why we believe it matters?"

John Williams: Now, at some levels, it really isn’t a new approach for us. Last year, our annual report focused upon the continued importance of a college education, which remains a critical component for our future economic success, both as individuals and as a country. Of course, learning doesn't end with college, and here at the Fed, we're constantly asking questions. We're pouring over the data, and we're searching for ways in which we can continuously improve our efforts.

What have we learned? Among other things, our economists have been studying changes in the labor market and the slowdown in China's economy. These are important questions, and the answers help us assess our economy as we consider issues related to

monetary policy.

Mark Gould: Our economic understanding relies heavily on data, but we've also reached into our communities to connect with a diverse set of leaders from the nine western states. These connections help us better understand local and regional conditions, offering insight into not only where our economy has been improving, but where and why people have been left behind.

John Williams: We've been studying what can be done for those who are left behind, learning about techniques like creative placemaking and transit-oriented development. They're being deployed in order to revitalize downtown cores and to jump start economic development opportunities.

Mark Gould: We make great efforts to study the past because we know it will help us as we attempt to understand the future. Here in San Francisco, we're surrounded by technology and we know that we must continuously ask questions about how technological changes could impact the safety and soundness of the financial institutions where families deposit their hard-earned paychecks.

Another core function we seek to continuously improve is our role in ensuring the authenticity

of currency in circulation. We're always seeking opportunities to improve our operations, and technology provides many solutions.

John Williams:	It's important to assess when and where we may need to reorient our path; in part, to examine whether or not we're living up to our standards as an employer. Are we a destination employer? Are we recruiting the best and the brightest, and does our team reflect the diversity of our District? 2015 was a year of change at the San Francisco Fed, and one in which our economy marked a milestone in our path back from the Great Recession. And, it was a year of continuous learning for all of us.
Mark Gould:	This year we're asking the question, "What have we learned in our ongoing efforts to create a growing and sustainable economy?"

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The Future of Cash

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Claire Wang and Doug Conover from the Federal Reserve's Cash Product Office discuss cash use and innovation in cash processing technology with First Vice President Mark Gould (video, 3:42).

An important role of the Federal Reserve is to maintain the quality and integrity of U.S. currency. The Cash Product Office has learned through its *Diary of Consumer Payment Choice* research that cash continues to play a key role in consumer spending. We've found that even if cash use were to decline 2½ percent over the next 20 years, the Federal Reserve would still be counting 20 billion notes. For the 2015 annual report, *What We've Learned...and why it matters*, we understand that Reserve Banks will continue to process and count an extremely high volume of cash. In serving financial institutions and the public, we've learned that it's essential to continuously innovate our cash processing technologies for optimal productivity and efficiency.

TRANSCRIPT

Mark Gould: What would happen if cash usage were to decline in the future? What would that mean for us and our operations?

Claire Wang: That's something we have been researching a lot in the Cash Product Office—is where is there potential for cash to decline, and especially in the retail space, we have seen a consumer shift from cash to electronic payments, particularly debit card. But even if people were to continue moving from cash as a payment instrument to cards, and even if they moved from buying things in person to online or through their smartphones, where they can't use cash to pay, there would still be a lot of cash use going on and we would still be processing a lot of cash volume. Even if cash use were to decline 2½ percent over the next 20 years, we would still be processing around 20 billion notes a year, which is about what we were processing in the '90s, and that is still a lot of processing volume and a lot of cash going through our system.

Mark Gould: We're sitting here in Silicon Valley, the hotbed of innovation and payments and all other kinds of technology; are people still going to be using cash? Are people still using cash today?

Doug Conover: They are still using cash today. From our most recent study, it's actually 40 percent of all consumer transactions are made with cash, the highest of any other payment type.

I think one thing we are trying to understand is

how they are using cash and how that is evolving over time. Cash has a role as a store of value and in that role, we see very high demand for currency in circulation. People like having physical cash. The second is as a payment instrument, and there you do see some growth in other payment instruments, but there are lots of reasons why people continue to use cash. Cash is used overwhelmingly for small value transactions. It’s very convenient. It’s accepted almost everywhere for every kind of transaction. People find it as a convenient payment instrument.

Mark Gould: Doug, when we think about innovation, often we think about smartphones or electric cars or some new gizmo. Cash isn't necessarily the first thing that might come to most people's mind. Could you talk a little bit about innovation that we are leading in the cash business?

Doug Conover: We really have been doing our best to take advantage of technological developments. I can think of two examples in the cash business. The first is over the last several years, we have made a lot of investments in our sensor technology, which have really helped us maintain the quality and integrity of U.S. currency, which is a key part of our

mission. At the same time, those investments have enabled us to reduce the cost of the print order for new money and also to keep our staff and our equipment as productive as possible and really leading to significant savings for the business.

One of the most important things we do is make sure that the operations are very well-controlled, and we're having effective risk management. We have made some changes so that we can rely a little bit more on developments in camera technology to change how we use our controls and to save in terms of staff. The new technology helps us do a better job of distinguishing between fit and unfit notes, while enabling our productivity to be very high. So we're doing a better job of reusing notes that are fit for commerce and therefore reducing the number of notes we have to order from the BEP (Bureau of Engraving and Printing) in terms of new notes that would be put into circulation.

Mark Gould: Is that one of the reasons now when I pull twenties from an ATM, they come out all facing different directions?

Doug Conover: That's right. It also saves our customers a lot of money because instead of conditioning the note so that they are all face up, they can provide them to us in any orientation

whatsoever and our equipment will handle them that way.

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The Fragility of Finances

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SF Fed Community Development's David Erickson and Laura Choi sit down with President John Williams to discuss the fragility of American household finances and how to get more families on the road to economic opportunity (video, 2:23).

Most American households do not have enough savings to pay an unexpected $400 expense, according to a recent Federal Reserve survey. It's one of the findings we discuss in the new book *What It's Worth* and one of three distinct stories told by our Community Development team in the 2015 annual report, *What We've Learned...and why it matters*. Financial insecurity and income volatility affect every facet of life including health, housing, employment, and education. Helping more families get on the road to economic opportunity requires holistic solutions.

TRANSCRIPT

John Williams:	You know at the Fed, we often think about things in terms of the macro economy—unemployment, inflation, and interest rates. But this new book, *What It's Worth*, really focuses in on the individual families and households and their financial well-being and situation. What are some of the key lessons

and learnings we got from the study and looking at what's happening at the individual family level?

David Erickson: If you think about it, the majority of American households, and this is from a survey that the Federal Reserve does, experience enough of a fragility in their household finances, that if they were hit by a $400 expense, they'd have to either borrow money, sell something, or just simply not pay it. If you think about how fragile that is, what happens if you have an unexpected medical expense, you have to pay for school, you have something that comes along that you just weren't really expecting. That really could send a family into a tailspin, and we're talking about a majority of Americans, not just low-income families. This is something that aggregates to have a very powerful effect on the macro economy.

Laura Choi: We have a much more nuanced and better understanding of the real financial lives of lower-income Americans. The picture we're seeing is really a story of income volatility. The reality of a steady, bi-weekly paycheck is just a thing of the past for most low-income families. We're seeing a lot of spikes and dips in income, and there's a real mismatch between when the income comes in and when the expenses hit, so it's leading to a lot of different coping strategies and just a lot of challenges

placed upon low-income households.

John Williams: What's one of the things you learned by bringing together people from all types of fields that you might not have known otherwise?

Laura Choi: I think one of the things we've learned from this book is that everyone has a part to play in devising solutions that lead to financial health. People experience financial insecurity in every facet of their lives, whether it's physical stress that leads to poor health or living in inferior housing that limits employment or educational opportunities, and in the same way, we need to come up with solutions that are similarly holistic and really help families achieve financial well-being so they can get on that road to economic opportunity.

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Creative Placemaking

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SF Fed Community Development's Laura Choi talks with President John Williams about creative placemaking, a neighborhood revitalization strategy that engages local artists and performers (video, 2:51).

In the 2015 annual report, *What We've Learned...and why it matters*, we discuss creative placemaking, a new concept that refers to the enhanced role art plays in our communities. We've learned that creating culturally relevant spaces, ones that are vibrant and attractive, increases a community's economic potential. Creative placemaking taps into local artists and communities, ensuring culturally significant voices are represented and reflected.

TRANSCRIPT

John Williams:	There's a lot of talk about creative placemaking. This is an idea I think a lot of people haven't heard of before. Can you help me understand what that is and where do you see that going?
Laura Choi:	Creative placemaking is a new idea. It's really

about enhancing the role of the artists within the community development process. So if we think about a developer, they might want to enlist an artist early on in the design process to create a space that is more culturally relevant, can increase economic potential, and really create a sense of pride and ownership among community members.

John Williams: You mentioned economic potential. I wonder, how does creative placemaking, bringing artists into this process, how does that change the economic outlook for a community? What is that really doing tangibly to its economic prospects?

Laura Choi: Through the creative placemaking process, if we can make a space more vibrant, more exciting, more attractive for people to come through, it can increase foot traffic along commercial corridors, which can help reduce crime, get people out walking, which can improve their health, and most importantly, it can really draw people together in public spaces and just be a central point for the community to gather and really strengthen each other.

John Williams: Creative placemaking—it sounds like a great idea. It makes sense to me. Why aren't we seeing more of this around the country?

Laura Choi: I think people intuitively understand the value of bringing art and culture into space, but it's harder to know how to implement it. The answer isn't necessarily just more art installations, but it's really about tapping into the creative potential of local artists in the local community itself, and making sure that their voices are represented in the actual built environment of their community.

John Williams: One of the things I see in the Bay Area is very active art and culture. This doesn't seem to be happening on purpose. How does creative placemaking fit into how you see the changes in our cities going on around us?

Laura Choi: I think it's one of those things that can happen organically as people move into a space. There's a desire to beautify and enjoy the place you live. I think in some of these neighborhoods where there is this dire need for revitalization, maybe artists are seeing that there is an opportunity. More importantly, there's an opportunity to engage the entire community. There's a tendency to think automatically about high art or fancy art.

John Williams: Like opera or something.

Laura Choi:

Right. Creative placemaking is really about celebrating local values. To the extent that there is local talent, and every community has local talent, whether that's children, youth, older adults. It doesn't have to be this masterpiece painting. It can just be celebrating your local culture and the values that you bring in your community.

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Health and Prosperity

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Health and community prosperity are intrinsically linked. SF Fed Community Development's Ian Galloway sits down with President John Williams to discuss the issue (video, 4:18).

In reflecting on community development trends for the 2015 annual report, *What We've Learned…and why it matters*, one of our biggest learnings is to advocate for health and community development organizations to share data with each other. Health often determines if an individual has a job or access to educational opportunities, making it a strong predictor of economic prosperity. A more holistic, collaborative approach to improving health—especially in areas with low-income households—can result in significantly better outcomes for individuals and for communities.

TRANSCRIPT

John Williams: I understand why the Fed would talk a lot about bank regulation and monetary policy and things like that, but why are we talking about health so much?

Ian Galloway: Health is a big part of economic productivity. If

you're too sick to go to work, or if you have to care for a loved one who's at home and ill, then that obviously affects your ability to contribute to the economy. Second of all, health is really more than just about healthcare. Health is something that happens in your neighborhood, in your home, in your community. It's, do you have a job? It's, do you have access to educational opportunities? Are you experiencing toxic stress because of your social context? All those things contribute to your long-term health. Obviously, the disparities that result have an effect on the economy.

It's a really important issue to the economy in a sense that if these disparities and health outcomes persist among low-income people relative to higher-income people, it's a drag on economic productivity.

John Williams: This is a new, exciting area around healthcare and community development. What are the lessons you've already learned and the big surprises you learned from this?

Ian Galloway: First of all, the people that care about health and the people that care about poverty are often working side by side in the same neighborhoods, which is interesting because they actually don't usually know each other. That's been one of the key focuses that we've

had here at the Federal Reserve—how do we bring more attention across those two fields so that they can learn from each other and leverage their good work?

It's often very difficult to attribute a given health outcome to a given social program or intervention. One of the things we really tried to emphasize is the need to share data across the health and community development fields.

I think that the best way to think about health is, it's the sum record of your challenges and opportunities in life. The good work that happens in community development and in low-income neighborhoods has a huge impact on whether or not you face adversity in life or whether or not you have access to opportunities that allow you to be self-sufficient. That is ultimately the barometer of success in our industry, is how healthy are you.

John Williams: I go back to the history of a lot of efforts around community development. Often it focuses on housing or it focuses on education or it focuses on healthcare. It seems to me, from my reading of this, is that we need to think about all of them. We can't just think of them in isolation. What are we doing in community development that helps foster that collaboration and getting all of those people together at the same table?

Ian Galloway: With our first Healthy Communities conference in Washington, D.C., the then-director of the Domestic Policy Council at the White House, Melody Barnes, gave the keynote presentation. She said, look, people don't have a transportation day. They don't have an affordable housing day. They don't have an access to fruits and vegetables day. They have all of those things every day. The problem with our conventional approach to community development has been that we provide access to those things in silos, which I think has been less effective than a more comprehensive place-based, neighborhood-scale intervention would be. That's one of the things we're trying to emphasize with this initiative is we need better cross-sector coordination and more focus on the built environment and the place that people are living in, and really try to wrap all of those people with as many services and accesses and opportunities as possible to improve their health.

John Williams: Well this is really an exciting area. It makes a lot of intuitive sense the way you describe it to me. Can you give me some concrete examples of where this is really happening in our District?

Ian Galloway: I'm really excited actually about the recent work in pay-for-success financing , which of course you know about, having written about it in *The Wall Street Journal*. Particularly around addressing the social needs of the chronically homeless. There's a couple of examples, one in our District here in Santa Clara and another in Denver, where they're using projected cost savings to the mental health system to pay for supportive housing for the chronically homeless. I'm very excited about that approach, and I really think it's going to the future of investing in the social determinants of health.

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China in the Global Economy

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SF Fed President John Williams talks with Zheng Liu, Mark Spiegel, and Fernanda Nechio of the international research team about China's economic slowdown and how it's affecting global economic activity (video, 6:08).

In the 2015 annual report, *What We've Learned...and why it matters*, we share our research findings about the slowdown in China's economic growth and its effects on the U.S. economy, emerging market economies, and global commodity markets. Cyclical and structural factors underlie the slowdown. We discuss the impact of trends in exports and investment, and the country's transformation from a manufacturing-based economy to a service-based economy. We believe China's days of 10 percent economic growth likely are over.

TRANSCRIPT

John Williams:	Zheng, China's growth has slowed quite a bit over the last five years. Are the days of 10 percent growth behind China? What is happening in China's economy, and what are the Chinese leaders doing to try to liberalize

their economy and keep it on its growth trajectory?

Zheng Liu: A lot of people have that question. I think essentially, the days of 10 percent growth are over. Since 2011 in fact, China has been slowing. The growth has slowed significantly. That has to do with the slowdown in exports because of the global financial crisis, and also the slowdown in investment growth. In the meantime, China has shifted away from a manufacturing-based to service-based economy. In the past 20 years, service sector as a share of total GDP has increased from around 30, 35 percent, to now about 50 percent. In early '80s, about 200 million people out of the 1 billion population lived in cities. Now it's 770 million out of 1.3 billion.

Along with the structural change, when the economy shifts away from manufacturing towards services, when there is a structural policy, reform policies continue to be implemented, the economy will naturally slow down. This structural factor coupled with the cyclical factor I mentioned—export, investment—together lead to the slow growth in China.

John Williams: Mark, as you think about the potential implications of a slowdown in China for the U.S. economy, especially in light of the fact that we're all so interconnected in the global

economy today, what do you think a slowdown in China would mean for prospects here at home?

Mark Spiegel: China is a large country and an important trading partner of the United States. But overall, trade with China is still a small number relative to the overall size of the U.S. economy. Therefore, the direct implications from lost trade with China on the U.S. economy are likely to be limited. However, there is a possibility that the slowdown in China will have indirect implications for U.S. trade patterns, because of the fact that China is an important trade partner for other countries as well. There are some risks that might make us think that that might be the case in the sense that as China has been re-balancing towards its service sector, its service sector has been growing and overall GDP, the headline numbers, are not small enough to be indicative of a hard landing. But those numbers hide the fact that, while the service sector is growing, the service sector is not one that is relatively open to trade. Most of the trade that China does is because of its industrial sector.

John Williams: Fernanda, China is now the world’s second-largest economy and clearly, it's much more connected with the rest of the global economy and with the U.S. economy. What role has

China's economic development over the last few years played in affecting oil and other commodity prices?

Fernanda Nechio: In recent years, we've seen a big increase in the supply of commodities and oil. In terms of oil production, we have been seeing alternative sources of oil and alternative ways of producing such, as shale oil and fracking. We are also seeing some geopolitical changes. Weakening demand plays a role. China is the biggest consumer of a number of commodities and also one of the largest importers of crude oil. The slowdown in the Chinese economy has to play a role in the declining commodities and oil prices. One thing that we have to keep in mind is that although China is a big player in both commodities and oil markets, its relative importance is much bigger for commodity prices. Something else has to be driving the decline in oil prices.

Analysts have been estimating that the bulk of the decline in oil prices has been caused by the increase in supply that I mentioned before. The estimates are such that around 20 to 30 percent has been driven by demand, by the declining demand in China and other economies.

John China is a big factor, but it's not the only one.

Williams: There are really extensive trade linkages between China and other emerging market countries. When you think about China's slowdown, it could have a pretty big negative effect on some emerging market countries. How do you think of that in terms of what are the effects going to be on emerging market countries on China's slowdown? Also what are some of the policy responses we might expect from those countries?

Fernanda Nechio: The direct effects come from countries that are very big exporters to China. As the Chinese economy is slowing down, these economies are certainly going to be affected negatively. In terms of the indirect effects, the slowdown in China's main trade partners may also affect other economies that don't trade as much with China. For example, we can take South Africa, a big trade partner of China, but [South Africa] also trades a lot with other countries in the region. As the Chinese economy slows down, the South African economy also slows down, and they're going to likely buy less goods from the other countries in the area, so other, smaller economies can also be affected. In terms of policy, the slowdown in China and the declining commodity prices that we talked about before is likely to ease inflation pressures in these emerging economies and to reduce their growth. This opens the opportunity for some governments and central

banks in emerging economies to try to take measures to boost the economy.

The risk to the U.S. and to other economies is that some of these measures to boost the economies may weaken their currencies, and this would affect trade competitiveness in the U.S.

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Redefining the Labor Market

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SF Fed economists Rob Valletta, Nicolas Petrosky-Nadeau, and Mary C. Daly share their thoughts on the U.S. labor market with fellow economist President John Williams (video, 6:06).

Changes in demographics, and in employer and worker needs, have redefined the U.S. labor market. We discuss the "new normal" in our 2015 annual report, *What We've Learned…and why it matters*. Observations include how the gig economy—or sharing economy—is affecting the part-time workforce. We also look at influences on labor force participation rates and clarify the math behind sluggish wage growth. A consideration for both is the retirement of higher-earning baby boomers and the increase in steady employment for lower-wage workers.

TRANSCRIPT

John Williams: We saw a huge increase in part-time, or involuntary part-time work, during the recession and early parts of the recovery because of the weakness in the economy. Employers didn't have as much work for their employees to do. But, now as the economy has improved, we're seeing some structural shifts in the labor market and the economy

also play out in terms of affecting these numbers. Is there a way that the gig economy, and how people are working part-time in the new parts of the economy is going to affect the structure of the labor market?

Rob Valletta: The gig economy certainly has its upsides, because given these kinds of desires that employers have for flexibility, one way that workers can fill in—people who want to work full-time—they can fill in their hours and get to a full-time schedule through these kinds of flexible options like ride sharing services and so on. The flip side of growing part-time work, is that at the same time, workers are also finding it necessary to try to find these kinds of gigs where they can fill in the hours that are not being provided to them.

As the labor market has improved, we've seen a reduction in the number of people who are working part-time, but say they want full-time work. Now that surged during the Great Recession to unprecedented levels. That is an indication of how weak the labor market was during the Great Recession and the immediate aftermath. The subsequent improvement has pretty much been in lock step with the overall improvement in labor market conditions. However, there is still an unusually high number of people who are working part-time involuntarily—those who say they want full-

time work—and that appears to reflect some relatively permanent changes in the labor market.

John Williams: Today the labor force participation rate is well below what it was before the recession started. What's going on with these people? Why are they not either working or looking for work? How do you see that changing over time?

Nicolas Petrosky-Nadeau: At any point in time, labor force participation is determined by how well the economy is doing, and what people want to do with their time. At this point in time, we can say that labor force participation is being held back by long-term changes in the labor market, and not the lingering effects of the recession. The silver tsunami of retiring baby boomers is a perfect example of this. As the Baby Boomer Generation retires, we have fewer people looking for work or working. That naturally pushes the participation rate down, but that's not the whole story.

We've looked into the data, and it appears that participation rates are declining for other age groups. For example, if we look at individuals who are of working age, most of the decline in participation rates that we see are taking place in households of middle- to high-incomes. This has been part of a trend that goes back over a decade.

John Williams: Does this mean that as the economy continues to improve, that you're expecting people maybe to come back into the labor force and start working again? Or do you think that basically labor force participation is going to stay where it is?

Nicolas Petrosky-Nadeau: To oversimplify a bit, people in higher income households have more flexibility. One person can go to work while the other goes to school, takes care of children or other household family members. What we've seen in the recent decades is a decline in the fraction of households with multiple earners. That tells us that, in all likelihood, individuals in higher income households are moving more towards the life of the work-life balance. If this is true, we're unlikely to see participation rates rebound as the economy keeps improving.

John Williams: Normally as the economy improves and unemployment comes down so low, we would expect to see wages pick up. Why haven't we seen the normal increase in wages in the economy of late?

Mary C. Daly: We actually have a math problem, not a wage problem. The math problem goes something like this: Essentially, during the recession, large numbers of low-wage workers were laid

off, lost their jobs, or fired. Because so many low-wage workers lost their jobs, the average wage in the U.S. rose. It was sort of an artificial boost to wage growth that didn't reflect the strength of the labor market, and in fact, was giving us a false signal about how good things were then. As the economy has recovered, the reverse has occurred. What's happening now is, as the labor market improves, lots of low-wage workers who were displaced, sitting on the sidelines, waiting for the economy to improve, came back into the labor force. As they get jobs, that's a good thing, but they have lower wages. That pulls down the average wage in the U.S. Essentially we've got lots of low-wage workers coming in and slowing wage growth now, and we had lots of low-wage workers exiting and raising wage growth earlier.

John Williams: What are other changes in the labor market or the economy, like demographics, that are affecting wage growth?

Mary C. Daly: The retirement of the baby boom is a really important factor in what we're seeing in wage growth right now. As workers who are at the peak of their earnings—really retirees—are leaving the labor force and going off into retirement, it pulls down the average wage in the United States because these high-wage workers are leaving and the average falls.

John Williams: With all the changes going on in the labor market, demographics and all the other things, what's the new normal for wage growth? What kind of wage growth should we be expecting to see in the economy over the next few years?

Mary C. Daly: It's going to be slower, in all likelihood, than we usually see. On average, wage growth is productivity growth plus inflation. But, right now we have slow productivity growth, low inflation, and then we have these demographic and other compositional changes that are all going to put downward pressure on wage growth going forward. Instead of seeing something like 3.5 to 4 percent and thinking that's normal, we're going to be looking for something like 3 to 3.5 percent and saying that's reflective of a healthy economy.

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Transforming Financial Services

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Banking supervision's Tracy Basinger explains why the intersection of finance and technology–fintech–is a matter of great importance and interest to the Fed (video, 3:23).

Innovations in technology are transforming relationships between the Fed, the banks we supervise, and their customers. In our 2015 annual report, *What We've Learned…and why it matters*, we explain how the Fed is poised to evolve alongside fintech innovations.

TRANSCRIPT

John Williams:	One of the key responsibilities here at the San Francisco Fed is that we supervise the banks in the Twelfth Federal Reserve District. A key part of our understanding of what's going on in banking and supervising, is understanding how the world is changing, how banking is changing, and conditions are changing. Everyone is talking about fintech. It's always in the news. Everyone says it's changing banking here in the Twelfth District. I've got a very

basic question. What is fintech?

Tracy Basinger: Other than a contraction of the words finance and technology, it's really about using technology to better deliver banking products and services. What you typically might go to a bank for, you can now sometimes do on your smart phone. It really took off in the area of lending where a lot of these so-called marketplace lenders developed platforms to deliver loans to consumers that were less expensive, easier to understand, and they could do it all online. The industry has grown to, as we understand it, well over a hundred such lenders.

We also have companies that make it easier for people to exchange money, so instead of having to hand you $20 to pay for my half of a dinner bill, I can actually text that to you through an app.

John Williams: In fintech, are these companies that the San Francisco Fed regulates, and if not, why are we so interested in fintech? Why does it matter for us?

Tracy Basinger: As a general rule, we don't regulate these companies, but the fact of the matter is that they're changing the dynamics of the marketplace. It's really important for us to understand what's happening in the

marketplace in order to understand how to execute our supervision responsibilities. Almost every one of these companies has a bank partner at some stage of the process. And since we regulate those banks, it's equally important that we understand what those partnerships look like and the implications for the banks and the consumers that the banks serve.

We here at the San Francisco Fed have spent time internally studying the market. We actually hosted a conference last year where we brought together bankers and regulators and fintech companies, consumer advocates, policy makers, just to try and enhance our understanding and actually get some feedback on how we should be thinking about these issues. We continue to work internally to build our expertise and now collectively across the Federal Reserve System to make sure that we've got a mechanism in place to really truly understand what's happening so that any reactions we do make are appropriate and don't have unintended consequences.

John Williams: Do you see this as primarily a bank supervision issue, or do you think it really affects other parts of the Fed as well?

Tracy Basinger: Well, I think it does affect other parts of the Fed. We certainly have payment system

responsibilities that really get at the heart of some of these new tools that are designed to make payments easier and faster. We also have engaged our colleagues from Research and Statistics to make sure that we collectively understand the issues at play here and that they can consider that in their work as well.

I would hope that a year from now we would not only have enhanced our understanding, but have a good mechanism in place to actually follow these developments and be prepared to react to them as appropriate. One of our goals would certainly be to do things that foster the responsible innovation that does in fact result in better outcomes for consumers; and keeping in mind that our overall responsibility is for the safety and soundness of the institutions that we supervise and to protect the consumers.

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Regional Influences on Monetary Policy

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SF Fed Branch Managers Robin Rockwood, Steve Walker, and Roger Replogle talk with President John Williams about ensuring the diverse industries and geographies within our District have a voice (video, 4:35).

In our 2015 annual report, *What We've Learned…and why it matters*, we explain how voices from regional economies influence monetary policy decisions in Washington D.C. We describe how we network with business and community leaders and share an example of how monetary policy stimulus has encouraged business investment.

TRANSCRIPT

John Williams:	Why do we [the San Francisco Fed] have Branches and what do Branch Managers do?
Robin Rockwood:	We have Branches because it's important for all of us at the Federal Reserve to understand what is happening in the micro-economies from all of the states and the regions that we

serve. I interact and meet with a lot of the community and business leaders, and from there I'm able to make connections to use that network to understand more about what's going on in the local community. I often travel to Idaho and meet with business and community leaders in the Boise area, and in southern Idaho, Twin Falls, Idaho Falls, and so forth.

John Williams: How do we make sure that from our directors and our other advisory boards, we're getting the whole view of the District and all the diversity of the industries and diversity in our society? How do we make sure that we get all those voices to the Fed?

Steve Walker: Having all those voices is so critical and key for us, and we try to get all the industries that are key to our District so that we can have that type of voice. We also are there for our communities, because we need to be that ear to the ground type of being able to glean information economically, what's going on locally. We have to do that through various ways. One of them is through our boards of directors and some are through just meetings with business leaders and community leaders, small businesses, large businesses. We want to hear that information.

John Williams: Can you give me an example of what you've learned that you think has been valuable for us to understand what's happening in our District?

Steve Walker: Oregon—a lot of people think about it as a timber state, and it is. Timber and lumber are very important to us. One representative on our board represents a large timber company and lumber company. He has told us that times have been pretty tough in 2015. Lumber prices have fallen 17 percent. At the same time, he shared some good things in the fact that because long-term interest rates have been low, they've been able to invest in long-term capital projects in their sawmills (and expand there); and also have been able to acquire a lot of timber lands to help their company.

John Williams: What do you do as a Branch Manager in LA?

Roger Replogle: My responsibilities really are two-fold. One is keeping the Branch a vibrant place to work for our employees. The second piece is going out into the public and bringing directors in to us that give us the kind of data that's forward-looking; and being able to provide that information to you and your economists in San Francisco so you can use that in formulating

your decisions on monetary policy. Our zone is very, very big. We go from the entire state of Arizona; Clark County, Nevada; the southern half of California. I always also try to make sure that when I recruit directors, I'm looking at the various regions. I always try to have somebody that can talk for Arizona, that can talk for the San Diego market, can talk for the inland regional area of Los Angeles. Those are all major markets that I feel really have to have a voice.

John Williams: Do you think that the general public, or people out there, understand that we're actually talking to members of the community in a regular way like this? Is this one of these hidden secrets of the Fed?

Roger Replogle: It's sadly, I think, a hidden secret. I'll go back to a conversation I had on an airplane a couple of years ago. I sat down and the gentleman next to me asked, "Who do you work for?" I mentioned I work for the Federal Reserve Bank of San Francisco and he said, "This is going to be an interesting flight." I will tell you, from the tone of his first remark, I could tell he had a lot of real hard questions about, were we doing the right thing, were we approaching this correctly. After two and a half hours of discussion about how we go about interacting with our directors, how we look to get feedback from not only Fortune 100 companies that

serve on our board, but we have community. We have labor. We have small business representation. We don't just have the large banks. We have a lot of community banks.

I think him understanding that we're really looking at grassroots information, looking forward instead of the post-perspective data that happened three months, six months, a year ago, gave him a lot more confidence that, "I didn't realize the Fed did it this way. I thought you were kind of data-wonks and you looked at the numbers and it's all data dependent is kind of the mantra." It is, but it's also what is happening that we haven't seen. I think after that conversation he said, "I am so happy that I asked you who you work for, because I have a different perspective about how the Fed goes about setting monetary policy."

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Technology for Today's Fed

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Applications Manager Siva Iyer talks with First Vice President Mark Gould about how our IT solutions enable the SF Fed to fulfill its mission (video, 5:16).

The Fed's IT team is responsible for developing and securing one of the most important technology infrastructures in the world. We describe the role that IT plays in enabling the Fed to fulfill its mission in our 2015 annual report, *What We've Learned…and why it matters*. We learn the surprising facts about how our cash operations teams, bank regulators, and monetary policymakers rely upon our robust IT capabilities. Not only do our IT teams work on solving a variety of large-scale and unique issues, but they must do so while upholding the highest information security standards.

TRANSCRIPT

Mark Gould: I think a lot of people would be surprised at the number of IT employees that we have here at the Federal Reserve. Can you talk a little bit about what they're doing and why it's such a big piece of fulfilling our mission?

Siva Iyer: IT definitely fills in a lot of roles at the Fed. We look at IT as a key success partner to our business goals. IT provides a wide range of services all the way from productivity tools like desktops and mobile devices, to custom software which are the cornerstone of our operations. One example of this is the software we provide for our supervision and credit division, which helps them regulate banks, which in turn ensures that the banks and their customer assets are always safe and sound.

Another example of custom software we provide are those which help our customers, which are the depository institutions, conduct their business electronically with us. Some examples of these are software which helps them conduct their daily currency operations with us, as well as software that helps them send in their statistical data to us. The one key area that I want to call out is information security. Information security is really important to us. We ensure that all the data in our networks and all of our information assets are extremely secure, and we go great lengths to ensure that we prevent any threats to those.

Mark Gould: That's a pretty extensive portfolio that you just mentioned. As we know in San Francisco, especially, technology is moving very rapidly. Can you talk a little bit about how we adapt

and change in sync with all of this technological change?

Siva Iyer: One of our key guiding principles is to be an agile and innovative service provider that not only focuses on providing high value solutions but also in a very cost-effective way. One of the ways in which we have achieved this is by creatively structuring our workplaces and our teams so that they can succeed jointly in a fast-paced environment. Some examples of these are how we have created virtual teams across geographies. At the same time, how we consistently practice a lessons learned exercise every two weeks so that we are continually improving in that process.

The other area which is of key focus to us is exploring new technologies and how they help us fulfill the Fed’s mission in a completely new way. An example of this is digital technologies and the amazing space of big data. These offer keys to new capabilities that we can provide to our business. We really take pride in terms of being a robust organization, at the same time being agile and responsive to our business needs.

Mark Gould: How do you make sure you have all the right people on your team? You’re obviously looking for certain skill sets, but what else does it take to have a great team in delivering on these

applications.

Siva Iyer: One of the things that we have learned is our teams work the best when they learn from each other. To do this, we seek diversity. We not only bring in people who have diverse skill sets, but also bring in diverse perspectives and life experiences to the table. The nature of problems we solve on a day-to-day basis are really unique, and we value the diversity of those perspectives on the table when we are looking at approaching the solutions in a more holistic way.

Mark Gould: We're surrounded by high-tech companies here in San Francisco. Are you able to hire talent, and are people surprised that the Fed is doing this much IT work?

Siva Iyer: I think there are two ways to look at it. One is we are definitely fortunate to be at the zone where there's a lot of great talent available in the market. The second is we have to differentiate ourselves, and we look at differentiating ourselves in three ways. The first is with the robustness of the organization that we are, the second is the public mission that we stand for, and the third is how we do our job, which is to focus on the agile and the innovative ways of executing the day-to-day job.

Mark Gould: In December 2015, the Fed raised interest rates for the first time in about a decade. The decision was one thing, executing that decision was another. Can you talk a little bit about the work that our teams do behind the scenes to enable that to occur?

Siva Iyer: The process is not as simple as waving a magic wand and making interest rates change from 0.25 percent to 0.5 percent. What we do in IT is support a set of robust solutions that help the policymakers adapt to the changing needs of the market place. What we ensure is our systems are nimble and we are able to quickly respond to some of the changes that they would like us to make.

What is really interesting about this process is that we do not know in advance what are the changes that need to be made to these systems. At the same time, we do not know when the changes have to be made to these systems, but our teams are ready to operate at a moment's notice and respond to the change.

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Becoming a Destination Employer

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SF Fed human resources and diversity leaders Teuila Hanson and Rita Aguilar talk about traits of a destination employer and how the SF Fed is changing to attract and retain new generations of workers (video, 5:17).

What makes the SF Fed a great place to work? Like other high-performing organizations, the SF Fed competes for talent to fill mission-critical roles. As part of our 2015 annual report, *What We've Learned…and why it matters*, we discuss our unique employee value proposition and mission that help us hire exceptional and diverse talent. We also discuss the challenges of attracting, developing, and retaining a contemporary workforce.

TRANSCRIPT

John Williams: People matter. For us to be the best at what we do, we need to focus on our people. To do that, we need to start with great experiences, compelling leaders, and opportunities to grow and be accountable for achieving great things. At the San Francisco Fed, we really need to

have employees that are engaged and excited about our public mission and also thinking about new and creative ways to do our work. You talk to a lot of our employees. What do you think really motivates San Francisco Fed employees to come to work?

Teuila Hanson: Our employees are absolutely motivated by the mission. It's really important to understand how our employees are experiencing the organization in a way that's motivating them to do their best work. That's what we want. We want our employees to do the best work, so we're successful, so that we are fulfilling the mission.

There are key components of the employee experience that, in HR, we take a look at. We want to make sure that we are filling each of these buckets. One of those buckets is meaningful work. Employees want to make sure that they're working on something that means something. It's going to contribute to a purpose that's meaningful to themselves and what we have to our nation.

Employees also want to make sure that they have a fantastic work environment. It usually means that it's a diverse and an inclusive environment where there's different perspectives and people with different backgrounds. They can be authentic at work, but they're also contributing to really great

ideas and innovations.

Employees also want to work in an environment where they have great management: managers who are coaching; who are providing feedback; who are giving them positive feedback as well as constructive feedback; and managers who are invested in growth and development for employees. Employees also want trust and confidence in leadership. They want to make sure that their leaders are inspiring them, they're motivating them, and they're able to connect the dots between the purpose and mission of the organization and what it means to come to work.

John Williams: We want to be a destination employer. What does that mean? What is a destination employer?

Teuila Hanson: A destination employer means that it's the place to be and it could be for a number of reasons. Primarily it's that we have a competitive advantage so that when people see that our bank is hiring, we're number one on the list. We are able to recruit the very best talent and then once they're here, retain them. It doesn't mean that we need to have ping pong tables on every floor or that we need to have freebies for our organization but that we are looking at that right recipe, the right

experience—which I mentioned—around meaningful work, trust in leadership, great management, an awesome work environment. If we're able to provide those elements to an employee, then we are the destination employer.

John Williams: One of the fantastic things about the Twelfth Federal Reserve District is it's an amazingly diverse place in terms of culture, in terms of society. Of course, we need to have our workforce be as diverse as our District population. Now, we've made a lot of efforts towards getting greater diversity of thought, of experience, but quite honestly, we're not where I think we need to be. Rita, tell me about what you're doing around initiatives around diversity and inclusion.

Rita Aguilar: John, addressing diversity goes hand-in-hand with creating an inclusive environment to make sure that we're attracting and retaining the best employees possible.

John Williams: When people talk about diversity, they often think about it in kind of a narrow way, about, "Well, we want to have diversity across ethnic groups or racial groups or things," but I think we're trying to push for a broader definition of diversity about having diversity of thought. In addition to those, having diversity of thought,

and really trying to tap into the diversity of experience of our folks and being more innovative and more creative. How do you think about some of those aspects?

Rita Aguilar: I think when you look at our population here at the Bank, I think our conventional thinking is that we look pretty good. We're a pretty diverse workforce, but you're right. We're moving to that place of focusing on diversity of thought, diversity of the experiences and the backgrounds that people bring to the environment, and that help us be more innovative and creative. We're also focusing on our internal affinity groups. We're allowing them to contribute to the goals of the organization and to be the face of the organization as it relates to employee engagement.

Lastly, we can't forget our leaders. Our leaders play a very important role in that process and they are now part of our newly re-chartered Diversity Council. They provide that direct link from decision-making to our diversity and inclusion goals.

John Williams: I think there's a lot of opportunities out there to get people to understand who we are and, hopefully, maybe some of those people will become interns or, later on, easily be leaders in our organization as well.

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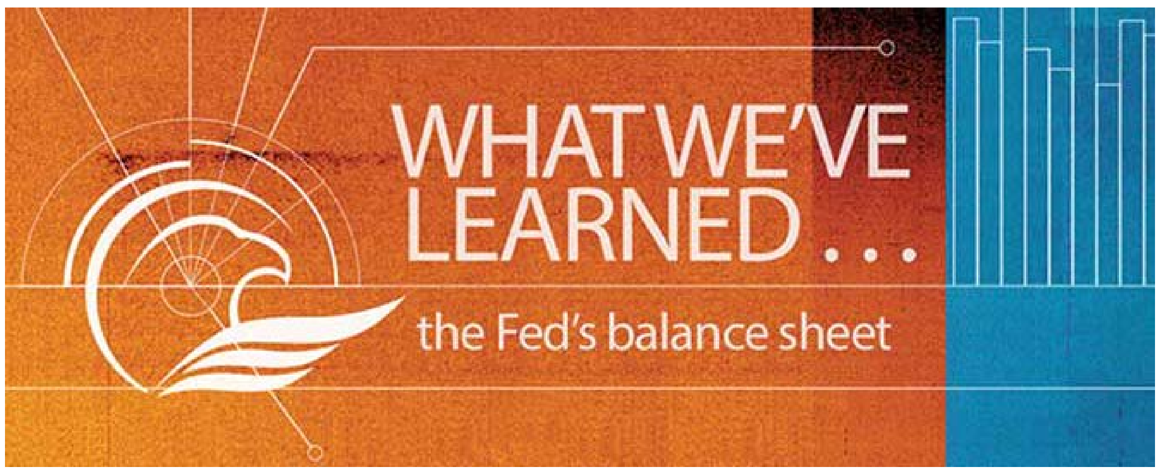

In a conversation with Executive Vice President and Director of Economic Research Glenn Rudebusch, we talk about the Federal Reserve's extraordinary policy actions that have increased the size of the Fed's balance sheet to about $4.5 trillion. The discussion covers topics that include the 1913 Federal Reserve Act, the Fed as a lender of last resort, the effectiveness of quantitative easing (QE), and the December 2015 liftoff of short-term interest rates. We also look ahead to consider how the Fed's balance sheet is expected to re-normalize over the next decade. This podcast is part of our 2015 annual report, *What We've Learned…and why it matters*.

The Fed's Balance Sheet

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TRANSCRIPT

Matthew Schiffgens:	Hi, I'm Matthew Schiffgens, and I'll be your host for this podcast on the Fed's balance sheet. This podcast is the twelfth and final segment of the SF Fed's 2015 Annual Report, *What We've Learned…and why it matters*. I'll be talking with Glenn Rudebusch, Executive Vice President and Director of Research at the Federal Reserve Bank of San Francisco. Glenn, welcome.

Glenn Rudebusch: Thank you, Matthew.

Matthew Schiffgens: Following the largest financial crisis since the Great Depression, this episode of slow and steady economic recovery has been going on for more than six years. Glenn, during this time, what have we learned about the Fed's balance sheet?

Glenn Rudebusch: The balance sheet has been an integral part of this episode. We've started, again, with one of the most severe financial crises and recessions that the United States has faced. The Fed has, during that time, stepped up and conducted extraordinary policy action. The balance sheet was crucial in doing that, and I think we've learned a lot about the importance both for liquidity operations and lender of last resort, but also for the quantitative easing, how important it is to have that tool available for the central bank.

Matthew Schiffgens: So Glenn, can you explain to me, what is the Fed’s balance sheet?

Glenn Rudebusch: Almost everybody has a balance sheet. Government institutions, commercial businesses, individuals, they all have a balance sheet. A balance sheet is just an accounting of the assets and liabilities. The

assets, those are the things you own. The liabilities are the things you owe. You’ve got your assets and liabilities, and the difference between them is your net worth or capital.

The Fed has a balance sheet, and its assets side is pretty simple. The Fed really just owns government securities. The size of the Fed's balance sheet right now is about $4.5 trillion. About 95% of its assets are just in government securities, and shorter and longer term Treasury obligations and mortgage-backed securities from the federally sponsored enterprises or agency. That's on the asset side.

The liability side's a little different. The Fed has currency, primarily, or money, on the liability side. Usually you think of currency as an asset.

Matthew Schiffgens: Counterintuitive in a sense, right?

Glenn Rudebusch: Yes, right. You usually think of, "Oh, currency? That's a good thing to have." Well, that currency, if you look on it, it says "Federal Reserve Note." That's actually an obligation of the Federal Reserve, and it's a liability for the Federal Reserve. Currency, or cash or money, represents the bulk of the Fed's liabilities. That might be physical, the kind of currency we see,

or this money might be in electronic form. Banks have basically checking accounts with the Fed, and they've got so-called reserves. Those reserves are essentially electronic money that they can use to buy things. The Fed creates those reserves as well, and that's the electronic version of money.

The Fed's balance sheet is assets and liabilities, just like any other balance sheet, and it's very safe assets, these Treasury securities, these government obligations. The liability side, then, the Fed has created cash.

Matthew Schiffgens: How does the Fed purchase assets on its balance sheet, and where did it get the power to do this?

Glenn Rudebusch: The Fed was established in 1913 and given this power to create money and to really regulate the money supply by Congress, by law. It works in a fairly simple process. If we want to buy a government security, we would create money. This could be physical money, or we could print it, or we could create this electronic money. We would go out and buy the assets, so our balance sheet would increase. We'd have more liabilities in terms of more money or reserves out there, and more assets in terms of having this government security. If we turn around and sell the government security, then our assets go down

and we've also then received this cash, or this money, and we extinguish that. The balance sheet goes up and down as we buy and sell government securities.

Matthew Schiffgens: And so is this what they mean when they say we have an elastic currency that enables the Fed to shrink or expand the money supply?

Glenn Rudebusch: Broadly speaking. We're able to increase or decrease the money supply simply by buying and selling government securities.

Matthew Schiffgens: How does the Fed use its balance sheet to achieve its policy goals?

Glenn Rudebusch: The Fed's balance sheet has always been integral to its policy setting mechanism, and it's really been used in three different ways in terms of what the Fed was trying to achieve. Really, the Fed was developed in order to use its balance sheet to make emergency loans to firms during financial crises. That was the start of the Federal Reserve. The Federal Reserve's balance sheet would increase as it made these loans. In the financial crisis leading to the Great Recession, the Fed made about $1.5 trillion in this emergency lending. This was collateralized, short-term lending, very secure, but it was important to push that liquidity out into the marketplace. That was an

important part of the use of the Fed's balance sheet for a policy purpose.

Matthew Schiffgens: Historically speaking, this is traditionally what the Fed was created to do in times of financial panics, or runs on the banks, and again stems from the Federal Reserve Act and the powers provided to the Fed by Congress.

Glenn Rudebusch: Exactly, and we call this the lender of last resort facility of the Fed. It's really true for any central bank. The second part that's adjusting the short-term interest rate. That, too, has traditionally, that conventional monetary policy, has been conducted with the Fed's balance sheet by changing the amount of reserves and the amount of Treasury securities. It affects the supply and demand for short-term liquidity in money markets, and the Fed can set a target for a short-term interest rate. That's traditionally been the federal funds rate. That's conventional monetary policy.

What happened during the financial crisis and the Great Recession is that the Fed lowered short-term interest rates, from about five percent to about zero, and really can't lower those nominal interest rates much lower than zero. Yet, the economy was still underperforming. The recovery was very slow. There were worries about price deflation, and very low inflation in prices and wages, and so

the Fed wanted to add more monetary policy stimulus. It couldn't with short-term interest rates, so it used its balance sheet to work on lowering longer-term interest rates. This was the unconventional monetary policy that people talk about.

Matthew Schiffgens: What people called QE right?

Glenn Rudebusch: Quantitative easing or QE. This involved buying government securities, on a large scale, and injecting large amounts of liquidity into the system. As you pull the amount of longer-term securities out of the marketplace, that is, you're reducing the supply, that tends to push up the price of those longer-term securities. For a bond, price and yield are inversely related, so as you push up the price of those securities, reducing supply, then the yields fall. You're lowering longer-term interest rates, and that helps stimulate the economy.

Matthew Schiffgens: That makes it cheaper for American households to borrow money to buy a car or a home?

Glenn Rudebusch: Exactly. Once you've lowered longer-term interest rates, say by 50 or 100 basis points, probably the effect was on that order of magnitude, you're helping ease financial

conditions. Then, of course, that feeds through to the economy where we've seen this boost in auto and light truck purchases because of lower interest rates. Lower mortgage rates have helped revive the housing market, and so forth.

Matthew Schiffgens: Did QE work?

Glenn Rudebusch: Yeah, I think our best evidence is that quantitative easing, QE, did help boost the economy. The economic recovery's been slower than we had hoped, but I think that's because the headwinds holding back the recovery have been even stronger than we expected, not so much that QE didn't work. We had QE1, QE2, QE3, but certainly the evidence is that financial conditions eased, that longer-term interest rates fell with the announcement of those QE programs, and that helped support the economy.

Matthew Schiffgens: In addition to its balance sheet, the Fed also employed forward guidance. Can you tell me what that is?

Glenn Rudebusch: The Fed has been giving more information, more forward-looking information, about where interest rates are going to be in the future, and so that's forward guidance. This too can also

help lower longer-term interest rates. That is, if you were to promise to keep short-term interest rates near zero for a long time, longer than the market expects, then with that announcement, longer-term interest rates would also adjust down and help ease financial conditions right now because of those promises in the future. I think that's also been an important tool of unconventional monetary policy, an important tool of monetary policy stimulus.

I will say that the two tools do help reinforce each other. That is, taking concrete actions in terms of buying these government bonds, these large-scale asset purchases, helps reinforce the commitment for forward guidance. That is, the two reinforce each other. I think if we were to face another downturn, face another recessionary situation, and shorter-term interest rates were near zero, that the Federal Reserve, like other central banks, would consider both further quantitative easing and forward guidance for providing monetary policy stimulus.

Matthew Schiffgens: With such a large balance sheet pushing down long-term interest rates, how is the Fed able to raise short-term interest rates?

Glenn Rudebusch: This is an important part of what we think of as the re-normalization of monetary policy. Now

that the economic recovery is quite well established, and we're getting closer to meeting our goals on price inflation, the Fed in December of 2015 took a first step, just a small step, of raising short-term interest rates by 25 basis points, or a quarter percentage point. It's able to do that even though there's a lot of liquidity in the system, even though our balance sheet is very large, because it is able to use tools for paying out interest on reserves. That's an important part of why the Fed's been able to raise interest rates.

By paying interest on reserves, we're able to raise the general level of short-term interest rates in money markets in the economy.

Matthew Schiffgens: Where does the Fed get money to pay interest on excess reserves?

Glenn Rudebusch: Along with our balance sheet, which gives us this snapshot of assets and liabilities at any point in time, there's also an income statement. Other financial institutions or people or businesses have income statements, what money you're earning and what money you're paying out. The Federal Reserve has a fairly simple income statement. We get a lot of interest income, because we've got this large portfolio of government securities paying interest.

I should say that during the crisis, as we've increased our balance sheet, we've also increased the level of interest income quite dramatically. Something on the order of $80 [billion] to $90 billion on an annual basis has been accruing to the Fed. Each year we turn that over to the US Treasury. Expanding the balance sheet has really been a boon for our payments to the US Treasury. That's not what we're in the business for, we're trying to meet our macroeconomic goals, but that's where the money is coming from for paying interest on reserves.

Interest on reserves is an important tool for us to raise interest rates, but we’re not talking about a large amount of interest expense for the Fed.

Matthew Schiffgens: Glenn, thanks again for joining us today. Any final thoughts on the Fed’s balance sheet?

Glenn Rudebusch: As the economy continues to recover, as we return to normal, the Fed's balance sheet will shrink in a fairly straightforward, simple fashion. Again, these are government securities, they will pay off at some point, and the Fed will receive the principal from the treasury, the currency will return to the Fed, and the money supply will decrease. The Fed's balance sheet will just fall in a gradual, fairly predictable fashion over time. It'll not fall

to the levels of 2007, of course. The economy has grown since then, so we've got more currency outstanding.

Our best guess is that while currency and the Fed's balance sheet was about 700, 800 billion in 2007, when we re-normalize it somewhere in the next 10 years, say by 2025, the Fed's balance sheet would probably be on the order of $2 trillion, so about three times larger. That's the growth of the economy, and really the growth of currency. That's what we think of in terms of returning to normal, is returning to that normal trend or baseline growth over time.

Ultimately, I think that we've learned that the balance sheet and quantitative easing and these extraordinary monetary policy actions are crucial tools to have in our toolbox, in case we ever are faced by the kind of traumatic economic cataclysm that we were in the Great Recession.

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