Uncertainty Matters
(With Reference to Kinky Monetary Policy, Two Nickels and a Dime)

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of Uncertainty Conference

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Thank you, Evan [Koenig].[1]

It is a pleasure to share this platform with John Taylor. I first met John at a Carnegie Foundation seminar when he was Undersecretary of the Treasury; I have been among the legions of his admirers ever since. He is thoughtful, no-nonsense and, importantly, dedicated to making monetary policy work with maximum efficacy. We at the Dallas Fed are grateful that he chairs the advisory board of our Globalization and Monetary Policy Institute. And we all, as Americans, are grateful for his service and dedication to our country. Thank you, John, for being the good patriot and man that you are.

Uncertainty Matters
Uncertainty matters. A lot.

This won't be a surprise to many of you. The first thing you are taught in any MBA program, be it at Stanford, where I earned my degree, or anywhere else, is that "business" is the process of managing under conditions of uncertainty. All business executives worth their salt organize their teams and resources to minimize uncertainty of factors under their control; and they develop contingencies and operating tactics and strategies for factors over which they have no direct control. Obviously, the less-clear external influences are, the greater the degree of angst about budgeting and planning for the future. Even the saltiest of helmsmen cannot confidently navigate a ship in a dense fog.

Going back to the earliest days of the current recovery, my business contacts have regularly complained of the fog of uncertainty emanating from Washington: They have consistently cited fiscal and regulatory uncertainty as major impediments to capital investment and expanding payrolls. Given uncertainty about the implications for overhead of the Affordable Care Act and other government mandates, they've complained of not knowing what their all-in labor and other costs will be and of how that lack of knowledge has made long-term employment planning nearly impossible. I'm sure that many of you have heard similar complaints—or have voiced them yourselves.

What you may not realize is that until quite recently, economists who study business cycles and monetary policy paid scant attention to the effects of uncertainty on aggregate job and output growth. The profession's standard models assume that the economy is populated with households and firms that are identical to one another, or that people and businesses can insure away individual risk and so are effectively, theoretically, identical. It's become standard practice, too, to assume that decision-makers are hyper-rational in how they form their expectations of future policy and future events; they are assumed to fully understand how the economy works. To be sure, the economy is subject to shocks, so that its course is unpredictable. But that uncertainty, according to this school of theory, is of no real consequence for households'

decisions about how much to save and consume, or businesses' decisions about how much to hire and invest. The technical term is "certainty equivalence": In standard models, choices depend on what you expect will happen and not on the degree to which you are confident in your predictions.

Such thinking is far removed from reality and, thankfully, there's increasing recognition of that fact. A variety of uncertainty indexes have been developed and their importance in theory and in practice examined.[2] Pretty uniformly, these studies suggest that changes in uncertainty have significant economic effects and that uncertainty has been elevated in recent years.

In theoretical analyses, the impact of uncertainty is especially great when realistic financial and informational frictions prevent risk from being spread optimally. Because of such frictions, for example, debt contracts often require that borrowers post collateral. When uncertainty increases, so do collateral requirements, tightening credit and increasing the value of "safe" assets relative to other assets.[3]

There's more than one type of uncertainty. There's uncertainty about future average tax rates on investment income, for example, or the future pace of average labor productivity gains. This is aggregate uncertainty. There is also uncertainty that widens the distribution of asset returns across firms or the distribution of income prospects across households, while leaving aggregate average asset returns and aggregate average productivity prospects unchanged. This is cross-sectional uncertainty. Finally, there's the uncertainty that you feel when you think that you understand how the world works and then discover that you don't because something happens that you thought unlikely to happen.[4] In the extreme, these are "black swan" events: the "oh spit" moments we experience when we realize that we have fundamentally and disastrously miscalculated.

Black swans induce paradigm shifts: The world—or, at least, our thinking about the world—is never the same again. The Great Depression was one such event. The housing-market collapse that began in 2006 and then spilled over to financial markets is another. If the U.S. government defaults on its debt later this month, we'll have a third example. The unthinkable will have become real, and the "full faith and credit" of the United States will be a mirage rather than accepted fact.

There are myriad other events that, on a much smaller scale, lead people to question their understanding of the rules. For example, the recent decision of the Federal Open Market Committee (FOMC) to maintain the pace of its large-scale asset purchases in the face of a generally improving labor market outlook and a widespread perception within financial markets, right or wrong, that the Fed had telegraphed a dialing back of the rate of purchases may have increased uncertainty about the future path of monetary policy. That was one argument raised against the decision not to taper. I know, because I made the argument, and I was not alone.

Most real-world fiscal and regulatory uncertainty is a mix of aggregate and cross-sectional uncertainty. Given the aging of the U.S. population, we know that the revenues required to finance entitlement programs will certainly have to increase in coming decades. "Entitlement reform" may ameliorate the problem but won't eliminate it. Government purchases will have to be cut, relative to baseline projections, and tax revenues will certainly have to be increased. But

exactly which programs will be cut and which taxes increased, and when, is unclear and has been further muddled by the behavior of fiscal policy makers these past few days.

The financial crisis and subsequent recession exacerbated these problems by increasing the outstanding stock of debt. U.S. federal government debt held by the public has increased from 34 percent of potential GDP at the business-cycle peak in first quarter 2001 (shortly before the 9/11 attacks) to 36 percent in fourth quarter 2007 (just prior to the Great Recession) to 70 percent of potential GDP today.

This increased debt has been manageable as a result of a substantial fall in interest rates. Indeed, interest on the public debt has trended downward from 4.7 percent of potential GDP in 1990 to 3.2 percent in 2007 to just 2.1 percent in 2012 as the average interest rate on Treasury securities has dropped from 9 percent to 5 percent, then to its recent level of 2½ percent. Rates obviously cannot continue to fall, though, so the cost of servicing debt is sure to increase, even if the size of the debt relative to the economy stabilizes.

The Canary in the Mine: Capital Investment
Capital investment is the economy's canary in the mine because it's often the first thing to succumb to uncertainty. Also, once undertaken, capital investment is costly to reverse.

Investment has certainly been unusually sluggish in the wake of the recent recession. Going back to when our data begin, in 1947, net investment as a percent of GDP has fluctuated around a constant mean of 5.6 percent.[5] It boomed in the late 1990s, reaching 8.1 percent of GDP, its highest level in over 50 years. The only higher quarter on record was the second quarter of 1950 (shortly after John Taylor and I came into this world, although I am not implying causality). Its peak during the 2001–07 expansion was an unremarkable 6.9 percent, but the subsequent plunge was unprecedented in the post-World War II data: The U.S. capital stock actually shrank during the second half of 2009. Relative to its 5.6 percent long-run average, net investment as a percent of GDP fell by twice as far as it had in any prior postwar recession.

More to the point, the recovery in investment has been exceptionally anemic. Today, four full years after the trough of the recession in second quarter 2009, net investment as a percent of GDP is still only 3.2 percent—a level typical of past recession lows. Net investment as a percent of GDP was last at or above its 5.6 percent long-run mean 6½ years ago.

Small wonder then that nonfarm payroll employment has been slow to recover too. Through August we had restored less than 80 percent of the 8.7 million jobs lost during the Great Recession. Less well known is the fact that real GDP per capita only recovered its prerecession peak this past summer.[6] That's 5½ years to make up the ground lost during the recession. Previous post-WWII recoveries never required more than nine quarters maximum. A Dallas Fed analysis suggests that the recent financial crisis and its aftermath put the U.S. back by more than an entire year's worth of output, an equivalent of more than $120,000 per American household.[7]

Baker-Bloom-Davis and Better Comprehending Uncertainty
And what of uncertainty? I mentioned earlier that we now have several uncertainty indexes. One of these, focused on measuring policy uncertainty, was developed by our moderator, Nick Bloom, together with Scott Baker at Stanford and Steven Davis of the University of Chicago. The index is based on three different types of information: (1) a count of articles referencing

uncertainty, the economy and policy that have appeared in prominent U.S. newspapers (including the nation's premier paper, the *Dallas Morning News*); (2) a weighted count of tax-code provisions that are scheduled to expire; and (3) the extent to which professional forecasters disagree with one another about future levels of inflation and government purchases.

The Baker-Bloom-Davis index begins in January 1985 and runs through the present. High values of the index signal an elevated level of economic policy uncertainty. From 1985 through 2007—prior to the 2008–09 recession—the index has a mean of 94, and it exceeds 150 only 2 percent of the time (one month in 50; just six times in over 23 years). The index rose to above-average levels in the fall of 2007 and stayed at or above 94—but below 150—through the summer of 2008. Then, between August and September 2008, the index nearly doubled, rising from 96 to 188. Since September 2008, the index has at no time dropped below 100, and it has exceeded 150 on 31 occasions—more than half the time. It has soared above 200 twice: for two months in 2011, coincident with that year's debt-ceiling debate, and in December 2012, when a compromise implementation of sequestration was being hammered out. It'll be interesting to see what happens with the index in the wake of the past week's developments (or lack thereof) in Washington.

The point is that starting with the collapse of Lehman Brothers in September 2008, economic policy uncertainty has been consistently high, and half the time it has been extraordinarily high. It's difficult to prove "beyond a reasonable doubt" that this elevated uncertainty is causally related to the weak recovery we've experienced. But the hypothesis is surely sensible, the timing is certainly auspicious, and enough careful confirming analysis has been done to say that the preponderance of evidence favors the proposition that not just recent policy decisions, but also the manner in which those decisions were arrived at, have been a significant hindrance to economic expansion.

The Kinky Stuff: Monetary Policy
As to monetary policy, I would submit there are several links between monetary policy and economic uncertainty. First, though, some background.

Ordinarily, monetary policy works by influencing the current and expected near-term levels of short-term interest rates. Once short-term interest rates hit zero, however, the Fed turned to unconventional policies. By using massive purchases of longer-term Treasuries and agency mortgage-backed securities, these policies helped hold down term premia and support the housing recovery. Simultaneously, the Fed tried—and I emphasize *tried* because the message seems to have been garbled in the minds of some intended recipients—to influence expectations of its own behavior once asset purchases have run their course. These "asset-purchase" and "forward-guidance" policies are relatively unfamiliar, and their impact is uncertain.

One implication is that aggregate fiscal shocks—and, hence, also aggregate fiscal uncertainties—are likely to have outsize effects in current circumstances. Contractionary fiscal policy that would ordinarily drive down interest rates, providing offsetting stimulus to private expenditure, will have a larger-than-typical economic impact because this "crowding in" is absent once interest rates are confined to the zero lower bound. Expansionary fiscal policy, similarly, will fail to "crowd out" private expenditure if interest rates hold steady.

Second, because the zero bound complicates the conduct of monetary policy and short-circuits fiscal crowding out, it introduces a "kink," or discontinuity, in the economy's behavior. The existence of a kink means that uncertainty matters even if ordinarily it would not: "Certainty equivalence" no longer applies. When real growth and/or inflation prospects are weak—so that the economy is operating near the zero bound—downside risks to growth and inflation loom larger than they ordinarily would. More-aggressive-than-usual policy responses may be appropriate to avoid the negative implications of an encounter with the zero bound.

Paradoxically, though, once the lower bound on interest rates is binding, a less-than-usually-aggressive monetary policy response may be appropriate. I have tried to articulate this in FOMC meetings ever since we started down the path of quantitative easing, drawing on anecdotal reports from my CEO contacts and what I thought was common sense. But my arguments fell on deaf ears until my more learned counterpart at the San Francisco Fed, John Williams, produced a formal study that posited that the aggressive use of unfamiliar policy tools like quantitative easing and Operation Twist add to aggregate economic uncertainty and, if applied at all, should be deployed more cautiously than our more familiar tools.[8]

Large Margins of Error
In general, the objective of monetary policy is to provide households and firms with an economic environment that makes it attractive to use money as medium of exchange and store of value. Since many private contracts, including labor and debt contracts as well as capital expenditure commitments, extend out several years, a multiyear policy perspective is needed. A multiyear perspective is especially important when the economy may encounter the zero bound. The explanation is that by interfering with the normal conduct of monetary policy, the zero bound increases the likelihood that policy will miss its objectives year after year in the same direction, so that the errors accumulate over time.

Over the past five years, for example, PCE inflation has averaged 1.2 percent per year. The FOMC's announced long-term inflation objective is 2.0 percent. Over a single year, the difference between 1.2 percent and 2.0 percent inflation is inconsequential. Over five years, though, that small difference cumulates to a 4.26 percentage point difference in the price level, which is not insignificant, perhaps, if back in 2008 you took out a mortgage with a five-year balloon. Alternatively, nominal GDP growth over the past five years has averaged 2.4 percent per year, when ordinarily one might have expected 4.5 percent average annual growth (2.5 percent real growth plus 2.0 percent inflation). Again, the difference is inconsequential in any given year. Accumulated over five years, though, the level of nominal income today is fully 12 percent below what might reasonably have been expected when mortgage and auto loan agreements were made back in 2008.

Kindly note that I am not advocating any change to the FOMC's 2 percent inflation target. My point is simply to highlight the longer-term consequences of what might appear to be smallish, shorter-term deviations from the norm. Business operators plan capital expenditure and payrolls not in one- or two- or even three-year increments; they plan and budget over longer-term horizons. The nominal stability that people need if they are going to negotiate multiyear contracts is a multiyear nominal stability. A policy that "lets bygones be bygones" from year to year may not achieve this kind of stability, especially when policy options can become constrained, in the short term, by the zero bound. A policy that takes a longer-term perspective and is properly communicated and executed—so as to instill confidence that monetary policy

will hew to a 2 percent inflation target rather than fixate on the run-rate of the past four quarters or the outlook for the next four—may better supply the longer-term comfort that households and businesses need to plan and budget. Such a policy would reduce the uncertainty that monetary policy as it is currently conducted spawns and would be more effective in doing its part to assist in economic expansion.[9]

A Dime Between Two Nickels

I hope this is enough to get a conversation started. I will now turn the microphone over to John Taylor. In doing so, I am reminded of Ross Perot's quip when he was placed between Bill Clinton and George H.W. Bush for a predebate photograph in the 1992 presidential election. Noting that Mr. Perot was substantially shorter than the other two men, a reporter asked him how he felt. His reply: "I feel like a dime between two nickels." In contrast, compared to John Taylor, I feel like an intellectual dwarf—a mere penny sitting on the dais next to John's $100 bill brain. And I'm talking about the new, difficult to replicate $100 bill that will be released next Tuesday. Please join me in welcoming John Taylor to the podium.

Notes

[1] The speaker is indebted to Dallas Fed Senior Vice President and Principal Policy Advisor Evan Koenig for his input in developing the themes articulated in this speech.

[2] Uncertainty indexes are described and analyzed in the following recent papers: "Measuring Economic Policy Uncertainty," by Scott R. Baker, Nicholas Bloom and Steven J. Davis, unpublished manuscript, 2013; "Surprise and Uncertainty Indexes: Real-Time Aggregation of Real-Activity Macro Surprises," by Chiara Scotti, unpublished manuscript, 2013; "Fiscal Volatility Shocks and Economic Activity," by Jesús Fernández-Villaverde, Pablo Guerrón-Quintana, Keith Kuester and Juan Rubio-Ramírez, unpublished manuscript, 2012; "Risk Shocks," by Lawrence Christiano, Roberto Motto and Massimo Rostagno, National Bureau of Economic Research, NBER Working Paper no. 18682, January 2013; and "Uncertainty Shocks Are Aggregate Demand Shocks," by Sylvain Leduc and Zheng Liu, Federal Reserve Bank of San Francisco Working Paper no. 2012-10, January 2013.

[3] See "The Leverage Cycle," by John Geanakoplos, in *NBER Macroeconomics Annual 2009*, vol. 24, Daron Acemoglu, Kenneth Rogoff and Michael Woodford, eds., Chicago: University of Chicago Press, 2010, pp. 1–65. See, also, "Reviewing the Leverage Cycle," by Ana Fostel and John Geanakoplos, Yale University, Cowles Foundation Discussion Paper no. 1918, September 2013.

[4] This type of uncertainty is analyzed in "Understanding Uncertainty Shocks and the Role of Black Swans," by Anna Orlik and Laura Veldkamp, unpublished manuscript, 2013.

[5] Net investment includes additions to fixed capital net of depreciation.

[6] Real GDP per capita was $49,655 in 2009 dollars in second quarter 2013 versus $49,610 in fourth quarter 2007.

[7] See "Assessing the Costs and Consequences of the 2007–09 Financial Crisis and Its Aftermath," by David Luttrell, Tyler Atkinson and Harvey Rosenblum, Federal Reserve Bank of Dallas *Economic Letter*, vol. 8, no. 7, 2013, www.dallasfed.org/research/eclett/2013/el1307.cfm.

[8] See "A Defense of Moderation in Monetary Policy," by John C. Williams, Federal Reserve Bank of San Francisco Working Paper no. 2013-15, July 2013.

[9] For more information about tightening control of inflation expectations by putting a five-year inflation rate, in place of the usual four-quarter inflation rate, in the Taylor rule, see "All in the Family: The Close Connection Between Nominal-GDP Targeting and the Taylor Rule," by Evan Koenig, Federal Reserve Bank of Dallas *Staff Papers*, No. 17, March 2012.