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"Considering Alternative Monetary Policy Frameworks: an Inflation Range With an Adjustable Inflation Target"

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President & Chief Executive Officer
Federal Reserve Bank of Boston

Money, Models, & Digital Innovation Conference
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San Diego, California
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After spending much of the last several weeks in Boston experiencing an arctic blast, I feel fortunate the Global Interdependence Center's (GIC) Money, Models, and Digital Innovation conference was held in a decidedly warmer locale. I also feel very fortunate and honored to have received the GIC's Frederick Heldring Award for Global Leadership from my good friend David Kotok, who has previously led, and long been associated with, the Global Interdependence Center's conferences. I thank the GIC for this award, which of course honors a remarkable individual, Fredrick Heldring, whose life story[1] is inspiring. He was courageous in

the Dutch Underground in World War II, successful as a banking leader, a passionate advocate for investment in inner cities, and committed to many civic and philanthropic causes.

Before I begin my remarks today, let me note as I always do that the views I express are my own, not necessarily those of my colleagues on the Federal Reserve Board or the Federal Open Market Committee (FOMC).

I would like to start by reflecting on the past year's economic performance, which was better than most forecasters were expecting a year ago. U.S. labor markets have continued to improve; and with the unemployment rate now at 4.1 percent, I think we have clearly left the period of the Great Recession behind. Real GDP growth in the second and third quarters of 2017 was over 3 percent – well above the level of growth economists call "potential." By definition, if above-potential growth continues, as expected by many forecasters, labor markets will tighten further, likely pushing the unemployment rate well below its sustainable rate.

Inflation has also been subdued, especially considering that it has already been a fairly long economic recovery by historical standards. Low inflation has enabled the Federal Reserve to pursue a very gradual exit from the extraordinary monetary policy accommodation undertaken to address the financial crisis, the Great Recession, and the slow recovery. The Fed's policy accommodation, along with a well-recovered economy, have been generally good for asset prices, including stocks.

While the economic news has remained positive, the extent of the forecast "misses" by FOMC participants and private sector forecasters – our forecast errors for both inflation and unemployment – are relevant for the topic of this conference on money and models. On a quarterly basis, FOMC participants provide their economic forecasts for key economic variables,

called the Summary of Economic Projections or SEP. At the December 2016 FOMC meeting, the median SEP forecast was that 2017 would finish with the unemployment rate at 4.5 percent and core inflation (measured using the Personal Consumption Expenditures or PCE price index) at a rate of 1.8 percent. Instead, the unemployment rate ended up 0.4 percent lower than expected; and core PCE inflation, based on the data through November, was 0.3 percent lower than expected. While these are not overwhelming forecast errors by historical standards, the inflation miss, in particular, has received significant attention by some observers – as inflation has been lower than expected, despite labor markets that are tighter than expected.

My own perspective on this is that the recent misses in the Fed's inflation forecast have not been particularly large, taken in the context of the forecast errors made historically in forecasting inflation. The forecast errors for inflation also have not been particularly consistent or persistent, which would be expected if the Fed's inflation models were missing some fundamental change in the inflation process. As a result, I would argue that it does not seem justified to assume there have been changes in the underlying inflation process, based on relatively modest recent misses. Of course, if we continue to experience one-sided forecast errors for another year or two, the possibility of structural change should be considered more seriously.

Thus, I do not view the somewhat lower than expected recent inflation rate as particularly troublesome for near-term monetary policy. But looking to the medium and long run, I do see low and fixed inflation *targets* as a potential problem – particularly if we continue to experience low productivity growth, a low equilibrium interest rate, and the near-certainty of a slowly growing and aging workforce. In such an environment, with a two percent inflation goal, nominal interest rates are likely to be low, on average. As a consequence, when a recession

eventually does occur, policymakers would likely start with a low policy rate – perhaps 3 percent or so – leaving little room to lower rates to offset the effects of the recession. The desire to retain an adequate "policy buffer" – by which I mean the amount of room we have to lower rates to offset recessions – lies at the heart of my evolving thoughts on the appropriate monetary policy framework.[2]

If, as a result, we seek to avoid a prolonged low interest rate environment in the future, then my view is that policymakers should start studying and discussing alternative frameworks to make this outcome less likely. While there is little that monetary policy can do to impact productivity or labor force growth, policymakers *can* influence the prevailing level of interest rates by adjusting our medium-term inflation goal.[3] One option would be targeting a higher inflation rate,[4] so that nominal interest rates would be higher than otherwise – and there have been other more technical proposals (for example price-level targeting and nominal GDP targeting) designed to provide a greater buffer.[5]

I would also suggest that the optimal inflation rate is not likely to remain constant over time. An alternative, which would recognize that the inflation target should not necessarily be constant, is an inflation range with an adjustable inflation target. Within this framework, one could think of our inflation goal as defined by two components: A *range* of inflation rates that policymakers would find acceptable across many economic circumstances, and a medium-term *goal* within that range that policymakers would set, perhaps year by year, depending on specific economic circumstances.

In my view, adopting an inflation range that allows for movement in the effective medium-run inflation goal might be a helpful addition to the Fed's monetary policy framework.[6] An inflation range that allows some movement in the inflation target, depending on economic

fundamentals, would be treating the Fed's inflation goal more like the natural rate of unemployment, where we recognize that the natural rate will shift over time with demographic and other workforce characteristics.

Of course, the advantages of greater inflation target flexibility would likely be partly offset by some costs. For instance, it is likely that such flexibility would generate more uncertainty about inflation in the medium to long run, since we cannot know for sure how long productivity and demographic trends would persist.[7] However, if we set the range to – for example – 1.5 to 3.0 percent, and were successful in keeping inflation mostly in that range, this would represent a set of inflation outcomes that are similar to those the U.S. has experienced over the past 20 years.

Perspectives on Recent Forecast Misses

As previously mentioned, once a quarter, FOMC participants provide their economic forecasts for key economic variables. Among the charts that are included are the so called "fan charts," shown in **Figure 1** for PCE inflation. The fan chart shows that even at a 70 percent confidence level, the forecast errors for PCE inflation are quite large. Thus, with the current 2 percent forecast, it would not be at all surprising to have actual inflation turn out to somewhere between 1 to 3 percent.

The sources of these forecast misses are many: large, unexpected changes in energy, food, import or other volatile prices can temporarily disrupt overall inflation measures relative to the forecast; the economy can grow faster or slower than we expect; or our assessment of what is relatively fast or slow can be off. A good example of an unexpected price change is the

modification in wireless service pricing by many U.S. mobile carriers that occurred last spring. This change is one of the factors that lowered the PCE inflation rate relative to the forecast in December 2016.

Figure 2 provides some history on SEP[8] and private-sector forecast errors, comparing the median core PCE inflation rate forecast for one-year-ahead to the actual rate, based on both the SEP and the Survey of Professional Forecasters' fourth quarter forecasts for each year.[9] While the forecast error (based on the 2016 fourth-quarter forecast for the core inflation rate[10] for the fourth quarter of 2017) was clearly a miss, it certainly was not outsized relative to other one-year-ahead forecast errors made over the past 10 years. In addition, forecasters made both positive and negative forecast errors during this period, not persistently missing in one direction. This forecast record seems inconsistent with concerns of some observers who argue forecasters are missing some fundamental attribute of inflation dynamics.

Figure 3 provides forecast errors for the unemployment rate forecast, by comparing both the SEP and the Survey of Professional Forecasters' median unemployment rate forecast for the fourth quarter of the next year with the actual rate, for each fourth-quarter forecast. While the 2016 fourth-quarter forecast error for the unemployment rate in the fourth quarter of 2017 is not particularly large relative to previous years, there do seem to be persistent, consistent forecast errors in the same direction for the unemployment rate, unlike for the inflation rate. That is, since 2010, forecasters have regularly anticipated the unemployment rate would fall less than actually occurred.

From a short-run policy perspective, the inflation forecast errors do not seem to be particularly noteworthy, and would not seem to indicate serious forecast biases over the past decade. In contrast, the persistent forecasts that unemployment will not fall as much as has

occurred should provide policymakers pause, since at 4.1 percent the unemployment rate is already well below most estimates of the sustainable long-run unemployment rate. The most recent median estimate for the natural rate from the Survey of Professional Forecasters is 4.5 percent; the corresponding median longer-run unemployment rate estimate from the December SEP is 4.6 percent.

Models and the Monetary Policy Framework

Since January 2012, the FOMC has published a statement of longer-run goals and monetary policy strategy[11] that it reaffirms, sometimes with small modifications, at each January FOMC meeting. The statement provides the FOMC's tactical approach for meeting the Federal Reserve's dual mandate provided by Congress: fostering economic conditions to achieve both stable prices and maximum sustainable employment.

The statement explicitly defines the inflation goal as being a 2 percent inflation target.[12] The employment mandate does not have a numerical target because the natural rate of unemployment is primarily determined by non-monetary factors, must be inferred from other economic data, and has moved significantly over time.[13] The statement also clarifies that when there are misses in both elements of the dual mandate, the Committee should follow a balanced approach, by which we mean that we will give equal policy attention to deviations of employment from an estimate of full employment, and to deviations of inflation from its 2 percent target.

At the time of adoption of the statement on longer-run goals, the 2 percent inflation target was quite similar to the target set by most other central banks in developed economies.[14] Many

academic studies advocated for a 2 percent inflation target as being consistent with price stability, although many of them were conducted prior to the Great Recession. Most of this research that attempted to determine how large a policy buffer would be sufficient – and thus how high a target inflation rate would be best – generally estimated that interest rates were unlikely to reach the effective lower bound, but if they did, the expected duration at near-zero interest rates would be measured in quarters, not years.

Unfortunately, the economic history of the past 10 years has shown that many developed countries in the wake of the Great Recession and financial crisis were forced to hold interest rates near zero for many years, much longer than the earlier model estimates suggested.[15] Such low interest rate environments make it difficult to conduct counter-cyclical monetary policy, and can potentially undermine financial stability, as households and firms "reach for yield" in the face of low interest rates, almost always taking on additional risk as a consequence.

It is not surprising, in my view, that many estimates assumed that a period of prolonged low interest rates was unlikely. In an economy with rapid increases in productivity and an expanding labor force, periods of prolonged low interest rates are likely to be avoided in most recessions. However, the size of the negative shock from the Great Recession, along with fundamental changes in the economy,[16] have made it much more likely that future recessions could also result in prolonged low interest rates *and* a need to conduct monetary policy with nontraditional methods, such as asset purchases on central banks' balance sheets – rather than just through movement of short-term interest rates.

Figure 4 shows FOMC participants' assessments of the longer-run rate that the federal funds rate will settle to when the Fed has achieved both elements of the dual mandate.

Recognizing the effects of slower productivity growth and labor force growth on this so-called "neutral" rate of interest, SEP submissions have gradually lowered this measure since 2012.

In early 2012, both the median forecast and the central tendency of FOMC participants was that the federal funds target rate in the longer-run would be at least 4 percent. As of December 2017, both the median forecast and most of the central tendency expect that the federal funds target rate will be below 3 percent.[17] Since most recessions involve lowering the federal funds target rate by more than 300 basis points, this makes it seem quite likely that a low interest rate environment will become a more common occurrence.

Figure 5 illustrates one possible reason for the decline in the expectations of the longer-run or neutral federal funds rate. Productivity growth is much lower now than it has been for much of the previous 50 years. This lower productivity growth, as long as it persists, implies that real interest rates are likely to be lower on average.

Figure 6 provides another reason to expect lower real interest rates, which is the reduction in the growth in the civilian labor force. With slower population growth, fewer immigrants, and an aging population, the growth in the labor force is expected to be much lower for quite some time than it has been in previous decades. Again, this implies lower real interest rates.

One way to avoid periods of prolonged low interest rates would be to alter the inflation target in response to changes in our estimates of real interest rates – estimates that have been changing of late. This would make inflation, like the natural unemployment rate, a target that could vary over time. If, for example, the monetary policy framework set an inflation range of, say 1.5 to 3.0 percent, the FOMC could vary its medium-term inflation target to be high, low, or

in the middle of the range depending on economic factors that the Committee could determine at the beginning of each year. For example, in the current environment, with low population growth and low productivity growth, policy could move even more gradually to remove accommodation, and allow inflation to be somewhat higher in its range. Should the labor force or productivity grow more quickly, the Committee could seek to gradually reduce the inflation target within its range.

Using an inflation range would trade off the costs of more effective policy responses to recessions (and the potential financial stability risk that may attend prolonged low interest rate periods), with the costs of having somewhat less certainty about what the inflation rate would be in the long run. But as long as the inflation rate were in a relatively narrow band, such as 1.5 to 3.0 percent, the range would not be a dramatic change from actual experience and would therefore be less likely to impact inflation expectations. If changes in productivity and labor force growth occurred very infrequently, the inflation target would be stable – but at a level more consistent with avoiding prolonged low interest rates.

Concluding Observations

Recent forecast errors of inflation and unemployment have not been particularly large, and do not pose much challenge to continuing on the current path of gradual increases in the federal funds rate. Perhaps the bigger risk for short-run policy is the fact that the unemployment rate continues to fall further below sustainable levels, and will likely continue to do so going forward, risking the sustainability of the recovery.

A more significant longer-run matter, from my perspective, is the opportunity for the Federal Reserve's current monetary policy framework to adapt to the recent experience with prolonged low real interest rates. If the U.S. economy is to avoid a scenario in which the effective lower bound is reached and the central bank must use its balance sheet for asset purchases rather than move short-term interest rates for counter-cyclical monetary policy, then policymakers should consider alternative monetary policy frameworks that would make such outcomes less likely.

An inflation range with an adjustable medium-run inflation goal is one way to address such concerns, but there are a variety of alternative frameworks also worth considering.[18] In my view, we are approaching a time when a comprehensive reconsideration of the monetary policy framework is likely warranted, given the experience of the past 10 years. Any change we make should be designed to provide policymakers with the flexibility to set monetary policy appropriately as key features of the economy change, as they have repeatedly over U.S. economic history.

Thank you.

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[1] See https://www.interdependence.org/wp-content/uploads/2013/10/Heldring-Obituary.pdfhttps://www.interdependence.org/wp-content/uploads/2013/10/Heldring-Obituary.pdf.

[2] For additional discussion, see Jan. 8, 2018 remarks at the Brookings Institution by Eric S. Rosengren, *Reviewing Monetary Policy Frameworks*: https://www.bostonfed.org/news-and-events/speeches/2018/reviewing-monetary-policy-frameworks.aspx

[3] On average, overall or nominal interest rates equal the prevailing real rate of interest plus the average inflation rate – which should be near our inflation goal – we can move the overall average level of nominal rates one-for-one by changing our inflation goal.

[4] When the real interest rate is low.

[5] For more discussion behind the Fed's current monetary policy framework and alternative monetary policy frameworks see, https://www.brookings.edu/blog/up-front/2018/01/04/the-hutchins-center-explains-the-framework-for-monetary-policy/.

[6] Additional dimensions of such a framework would be how symmetric the range would be: Is flexibility to be used only when real rates are low, requiring a higher inflation goal? Or would we expect to adjust the medium-term inflation goal down when real rates are unusually high? And what status does the center of the range hold? Do we intend for inflation to average somewhere near the center of the range over a longer span of time?, Do we always plan for inflation to return to the center of the range at some horizon?

[7] In addition, FOMC participants would no doubt consider adjusting our medium-term inflation goal up or down only when we (and others) had estimated that a *persistent* change in real rate determinants had occurred and was likely to continue. Such an assessment is of course difficult and entails uncertainty

[8] Prior to the June 2015 medians, SEP medians are only available with a five-year lag. Proxies for the medians for the December 2013 and 2014 one-year-ahead forecasts for the fourth quarters of 2014 and 2015, for core PCE inflation and the unemployment rate used in the forecast error calculations for Figures 2 and 3 are calculated from the distribution of FOMC participants' projections reported in ranges of tenths in the FOMC meeting minutes.

[9] Of course, the actual values are revised over time. We have used the most up-to-date figures in the calculations.

[10] While total PCE is the target for this exercise, we used core PCE to avoid outsized errors that would be related to the often volatile food and energy prices.

[11] In order to provide more clarity about how the Federal Reserve implemented the dual mandate, the FOMC issued the Statement on Longer-Run Goals and Monetary Policy Strategy, which is important for clarifying to the public what monetary policy is about, and also for providing FOMC members with a common framework when conducting policy. FOMC members will have different opinions about economic conditions and where the economy is headed. Still, according to the strategy document, the way these differences are translated into different policy recommendations should be consistent across FOMC members, in that members agree to share the same inflation goal and assign the same penalty to deviations of inflation and unemployment from their longer-run values. The statement became effective Jan. 24, 2012, and was subsequently amended, effective Jan.31, 2017. See https://www.federalreserve.gov/faqs/statement-on-longer-run-goals-monetary-policy-strategy-fomc.htm.

[12] This is measured by the annual change in the price index for personal consumption expenditures.

[13] For example, the natural rate has varied as the demographic composition of the labor market has changed.

[14] Two percent was seen as a practical compromise between some academic work that suggested that zero (or even negative) inflation was optimal, and work on the other hand that saw value both in "greasing the wheels" of wage setting given reluctance of workers to take nominal wage cuts, and in providing the policy buffer that I have just discussed that comes with a positive inflation rate.

[15] Once the central bank gets stuck at near-zero rates, additional counter-cyclical monetary policy can only be provided through alternative monetary policy measures such as quantitative easing, which aims to directly influence longer-term interest rates and other asset prices.

[16] For example, declining productivity growth and slowing labor force growth.

[17] As of December 2017, the SEP median longer-run federal funds rate was 2.75 percent and the central tendency was 2.75 to 3.00 percent. Looking at the individual observations from the SEP "dot plot" shows that the majority of the central tendency expects a rate of 2.75 percent.

[18] Some have suggested simply raising the inflation goal, which would of course provide more of the policy cushion I have discussed today. Others have proposed using price-level targeting or some variant of it, which is a way of promising future inflation when the economy is weak, thus (in theory) adding stimulus by lowering real interest rates. This policy also has the advantage of making the price level – the cost of living – more predictable. And some have suggested following a nominal GDP target. The virtue of this framework is that it is flexible with respect to the mix of overall nominal growth that comes from real growth versus inflation. When real growth is slow, inflation is allowed to rise higher, similar to the flexible target range approach I have outlined.