Our Perspectives:
Commentary on the economy & regulatory policies affecting financial companies

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The Longbrake Letter*

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I. Stability Prevails, But the Foundation is Fragile

In previous letters I have discussed the growing imbalances in the global economic and political fabric. Because there is much at stake the established political and financial elite have an enormous vested interest to maintain stability at all costs. To date they have been successful. That success could be threatened at any moment by a triggering event of some kind or the muddle through approach could persist for a while longer.

I am reminded of the Biblical parable of the house built on sand. It was a fine house and served its occupants well. But its foundation was fragile and thus the house was swept away in a violent storm. At the risk of excessive hyperbole, I wonder whether this kind a fate awaits the existing global economic and political systems. I rather think that is not very likely, but I do think significant change is in the offing.

But, let there be no doubt that events such as the British Brexit vote, the rise of Donald Trump, the erosion of Angela Merkel's political dominance and the collapse of productivity and decline of real economic growth, are undermining the foundation of the old order.

In this month's letter I focus on productivity in the U.S., a topic I have visited several times before. It is a topic that deserves close examination because it is key to real economic growth and our society's well-being in the long run. Its importance is only now being recognized, which is a healthy development. Policies we have chosen to pursue in recent years including most importantly administratively managing all market interest rates through novel and aggressive monetary policy tools and engaging in fiscal austerity have not been successful in engineering sustainable and high quality economic growth. We may have nearly full employment but it is a lackluster result that inspires little passion or sense of accomplishment. Populist political movements and the ascendance of demagogic leaders is a response to the broader populace's verdict that the current system and its policies is not going in the right direction.

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Also included in this month's letter is an examination of the Congressional Budget Office's most recent economic projections, some possible logical flaws in its assumptions, and long-term implications of its forecasts and exploration of the consequences of alternative scenarios, including one in which productivity growth remains persistently low. There are also updates on U.S. GDP growth, employment, monetary policy, inflation and interest rates. The **Appendix** contains a detailed update of U.S. and global economic and political developments relative to expectations outlined in December 2015.

II. CBO Data Revisions

Every year, usually in August, the Congressional Budget Office (**CBO**), updates its projections for the next ten years for the federal budget. Often it also does a second update in January or February.

CBO combines data from congressional legislation covering taxes and spending with projections of economic variables to determine federal revenues and expenses for the next ten years. The difference between its projections of revenues and expenses is the annual budget deficit (once in a very great while it is a surplus). This exercise requires **CBO** to project key economic variables including population, employment, GDP, inflation, interest rates, housing prices, income, profits, productivity and several other measures.

There were several interesting revisions to **CBO's** economic assumptions in the recent update. Many validated trends that have been developing in recent years. But there were some surprises, too, which if they turn out to be on the mark, have profound and negative implications for the U.S. economy.

1. My Econometric Model and Scenarios of the Future U.S. Economy

Before examining **CBO's** economic data revisions and commenting on the implications, it may be helpful to describe briefly how I construct my economic scenarios since they can serve not only as a means of making my own forecasts but can also test the soundness of forecasts made by others.

a. Forecasting Perils

Forecasts can be made for individual economic variables or they can be derived from more complex models that attempt to measure the interaction of many variables, the flow through effects of feedbacks and time lags, and the impacts of policy interventions.

Few economists attempt to create their own complex forecasting models and instead either make estimates of economic variables based upon their experience and intuition or rely on "canned" econometric models prepared by others. There are risks to both methods. The "educated guesses" may be well conceived and reasonable, but much of the time the easier and safer approach is to make a forecast that differs little from the consensus of others.

Complex interactive models reduce the risk of overlooking linkages and feedback effects and, arguably, provide more reliable forecasts. However, models generally have two limitations. First, models generally

have a fixed architecture. For example, the architecture of most of the commercially-available econometric models, as well as the Federal Reserve's model, are built around a DSGE — dynamic stochastic general equilibrium — architecture which assumes that over time the economic will always revert to a general equilibrium. These models did not work particularly well in foreshadowing the Great Recession — partially because they did not include non-rational behavioral phenomena and partially because they did not incorporate adequately the interaction between activity in financial markets and real economic activity.

Second, forecasting outputs of model rely upon stochastic equations of historical data relationships. Forecasting outputs will be dependable if the current structure of the economy and relationships among economic variables are similar to the historical structure and relationships upon which the model's predictive equations are based. Significant changes, such as in the structure of the economy stemming from technological innovations, societal culture influencing behavioral responses, or political governance, can change relationships among economic variables in ways that are not captured properly in stochastic equations based upon historical data. All models, including my own, suffer from the risk that the past is not a good predictor of the future.

b. Integrate Model Outputs With Logical Analysis and Critical Thinking

For these reasons I have long argued that the forecasting outputs of models need to be combined with rigorous logical analysis of current developments and trends which are often not captured well or at all in models based on historical data.

One can see the wisdom in these cautions about economic models and reliance upon the stability of past relationships by asking why virtually the entire professional academic and policy establishment missed the dramatic slowdown in real potential GDP growth (see **Chart 1** below). Real potential GDP growth depends upon growth in total hours worked and productivity. The establishment missed significant changes in the behavior of both variables which have persisted long enough that they can no longer be dismissed as temporary cyclical casualties of the Great Recession.

c. Persistence of Lower Than Expected Growth in Total Hours Worked

Debate among academicians and policymakers about the decline in the growth rate of total hours worked is more advanced than debate about the causes in the collapse of productivity. The emerging consensus is that the "surprising" decline in the labor participation rate is not surprising at all when cultural changes and demographic trends are factored in. This has resulted in a new consensus that total hours worked will grow about 0.5 percent annually in the long run compared to a 0.9 percent growth rate in the population. This means that there will be a steady decline in the employment participation rate. While this development has negative implications for the long-term solvency of social welfare programs, such as social security and Medicare, general agreement that this will be a persistent phenomenon dilutes the typical tendency to engage in denial and spurs two types of policy debates. First, policymakers begin to examine how to respond to the consequences because they can no longer assume that the problem will be self-curing. Second, policymakers can explore ways to boost the employment participation rate through a variety of initiatives, such as free community college tuition and government infrastructure investment. It is not surprising that both presidential candidates are considering such initiatives.

d. Persistence of Lower Than Expected Productivity Growth

Productivity debate is at a much earlier state and denial is still the main driver. There is general acknowledgement that long-term productivity improvement has moderated some, but most believe that recent negative productivity is an aberration driven by short-term and temporary factors. Thus, most models of economic activity assume that productivity will rise over the next few years to a much higher rate than has prevailed over the past ten years. This is typical of a mean-reversion mentality and assumptions embedded in standard econometric models. However, the expected rebound has yet to materialize. The persistence of poor productivity as the economy approaches full employment is eroding complacency and denial and debate about the causes and future course of productivity is building. As I said, these debates are still at an early stage and thus there is less of a consensus about appropriate policy responses. However, there is growing global sentiment that greater government intervention may be warranted through fiscal spending programs. This sentiment is also being influenced by the failure of monetary policy to lift potential economic growth rates.

In **Section III** of this month's letter I summarize the evolving debate about the causes of the shortfall in productivity and whether this is a temporary or persistent phenomenon. Since no consensus has yet emerged, it makes sense to ponder the possible consequences of a world in which productivity is permanently much lower than the historical experience.

Table 1 shows average productivity over past time periods, as well as projections of future productivity. Over the 50 years from 1955-2004 productivity rose 2.19 percent annually. In the 11.5 years from 2005 to 2016 productivity has risen 1.18 percent annually. **CBO** assumes partial mean reversion to an average annual productivity gain over 2021-26 of 1.78 percent. Over the same time period I assume productivity averages 1.48 annually in my "**Slow Growth**" scenario and 1.81 percent in my "**Full Employment**" scenario. I have also constructed an alternative "**Low Productivity**" scenario in which productivity rises 1.32 percent annually during this period. I explore the economic consequences of this scenario in **Section III**.

Table 1
Historical Average Productivity and Forecasts — CBO, "Slow Growth", "Full Employment", and "Low Productivity"

	1955-2004	2005-2016	1955-2016	2021-2026	2016-2020
Actual	2.19	1.18	2.00		
CBO				**1.78**	1.64
Slow Growth				**1.48**	.93
Full Employment				**1.81**	1.13
Low Productivity				**1.32**	.79

e. Bill's Approach to Econometric Modeling

Like other econometric models, I construct predictive equations for key economic variables based on logical relationships with other available data measures and estimate the parameters of these equations based upon historical data. So, in that regard, my modeling is subject to the same historical structural rigidity

risks as are other econometric models. I do adjust for historical structural shifts. This limits the likelihood that forecasts are flat out wrong right out of the box, but does not accommodate the possibility of future structural shifts or those that might be underway but are too recent to be visible in the data. This is why logical analysis of current developments is important. It is always appropriate to raise the question of whether economic relationships are shifting and what potential impact such shifts might have on model forecasts. Thus, it is always important to consider the viewpoints and analytical justifications offered by others.

In addition to the risk of structural changes in the relationships among economic variables there is ever present the potential that the historical equations do not properly define the underlying relationships. In economists' jargon, this is called "specification error." For example, it is accepted theory that employment influences inflation. When unemployment is low, labor becomes scarce, labor's wage bargaining power increases, wages grow more rapidly, and inflation pressure builds. Economists refer to this relationship as the "Phillips Curve." But, although there is logic in the relationship between employment and inflation, there is not set agreement as to exactly how that relationship will play out. There are timing lags, changes in labor bargaining power, shifts in the composition of the labor market and other factors which may or may not be important to include in specifying the statistical impact of employment on inflation. I have a methodology, which differs in details from the methodology of others. I do not claim that my methodology is better or best. But, I do regularly review my methodology and change it when there is additional information that I judge to be relevant.

Like others, the historical data inputs I use come from publically available data sources. However, when it comes to forecasting values for economic variables I do have choices. I can accept the forecasts of others or I can make my own, either arbitrarily based on logic and "common sense" or derive them through modeling. The only forecasts of data from others I use as model inputs come from **CBO**. These data inputs are limited to historical (not future) growth in potential real GDP, non-inflation increasing rate of unemployment (NAIRU) — both historical and future, future growth in the non-institutional population, future growth in the eligible labor force, and the annual federal budget deficit over the next ten years. I could provide arbitrary assumed values for each of these variables in my model, but have chosen to rely on **CBO's** expertise.

In addition, I provide arbitrary assumptions for several variables, which I judgmentally vary for each economic scenario. These include: payroll employment, oil prices, housing prices, stock prices, business investment, and government investment. I can choose values for anyone of these measures based on the assumptions of others. I have done this for payroll employment growth in the "**Slow Growth**" scenario where I have replicated **CBO's** August 2016 forecast for payroll employment growth. But, I hasten to add that my assumptions for payroll growth differ from **CBO's** in my other economic scenarios.

Forecast values for all other economic variables are derived from the model itself.

f. Summary Comment

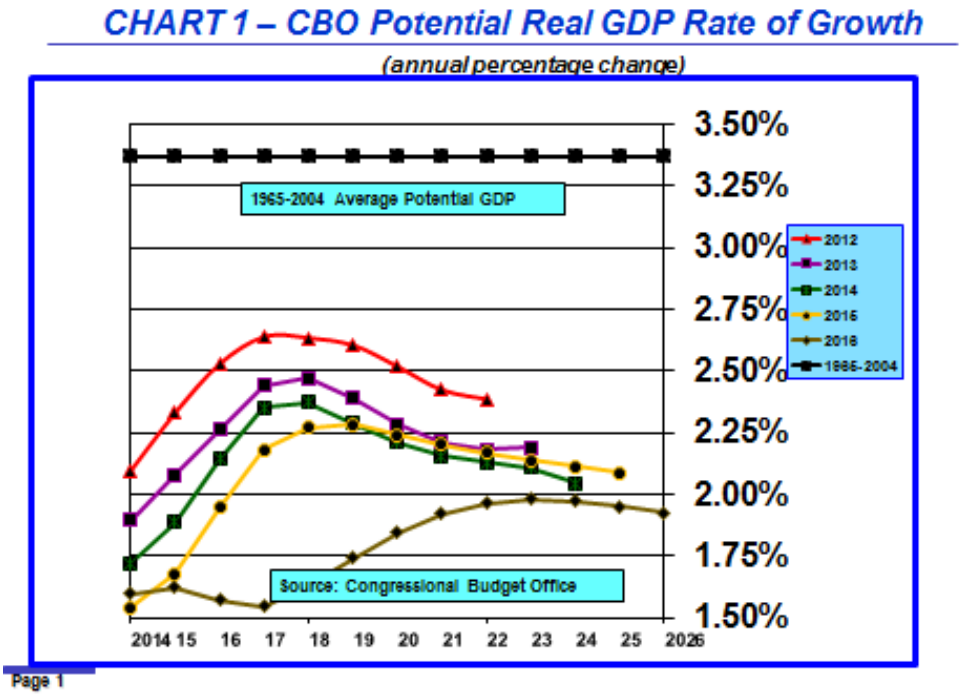
In summary, models can be useful tools, but if their use is not accompanied by critical thinking their data inputs and outputs can be misleading. Keep these observations in mind as I summarize **CBO's** August 2016 update of its economic assumptions and forecasts. The tendency to engage in "reversion to

the historical mean" is present at times as is a tendency to craft data inputs to conform to predetermined views of "what should be."

2. GDP Growth — Actual and Potential

CBO reduced expected 2016 real GDP growth by 0.6 percent and lowered 2017 by 0.2 percent.

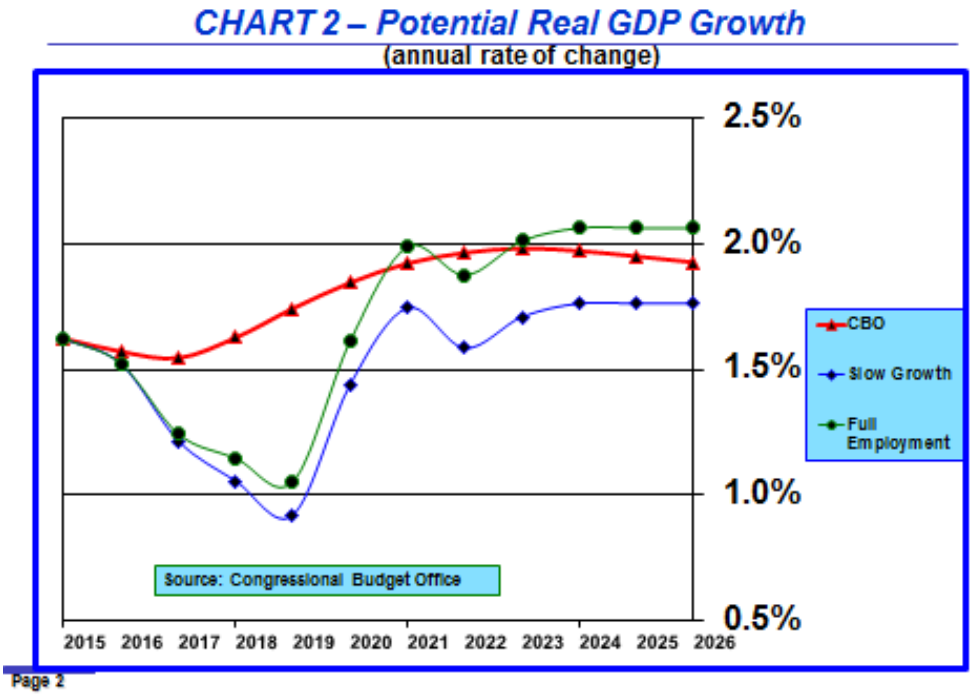
More importantly, **CBO** once again reduced potential real GDP growth. As can be seen in **Chart 1**, reductions in projected potential growth have become an annual exercise in recent years. This year's cuts to potential growth were huge, exceeding 50 basis points in the next two years, and even the long-term expected rate of growth was cut 10 basis pointed to 1.9 percent. The substantial near-term cuts were primarily the result of much more pessimistic assumptions about employment growth — more on this later — but also some reduction in productivity assumptions in nearby years, although productivity assumptions were increased for farther out years.



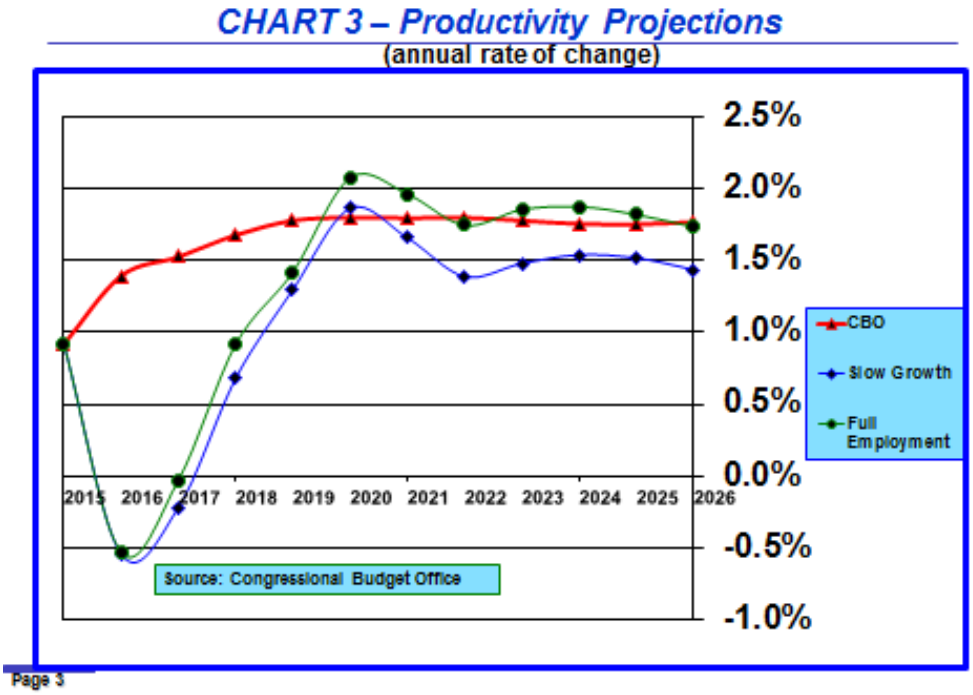
One has to wonder whether we have reached an end point to these revisions to potential real GDP growth or whether more reductions lie ahead.

I calculate potential real GDP growth by combining assumptions about potential growth in total hours worked and productivity. **Chart 2** compares my potential GDP growth projections for my "**Slow Growth**" and "**Full Employment**" scenarios with **CBO's** August 2016 projections.

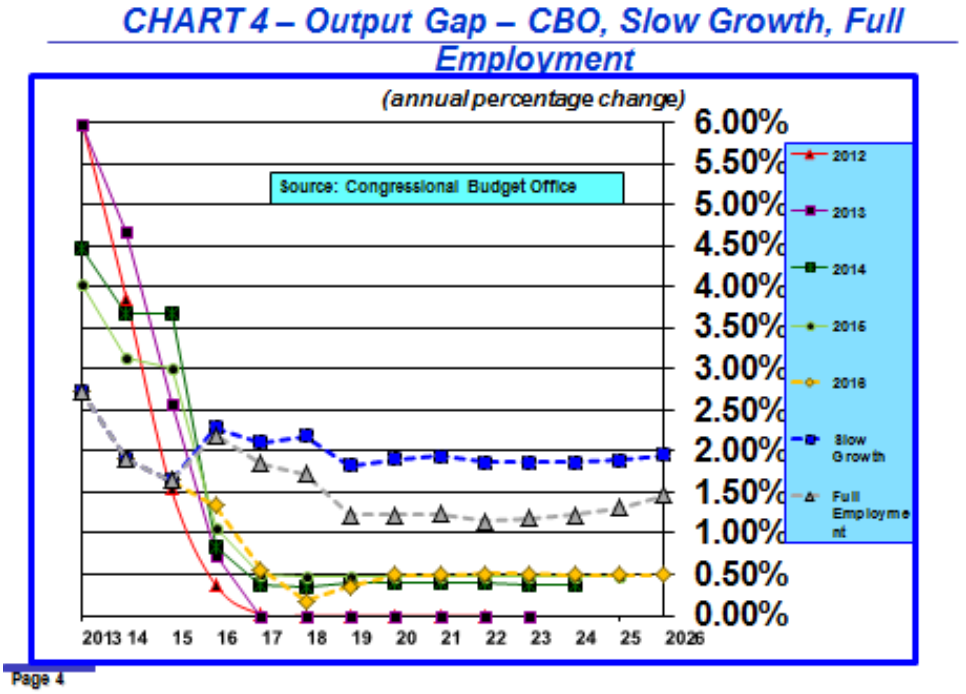
Notice that my "**Full Employment**" potential real GDP is very similar to CBO's from 2021-2026. That is because my assumptions about growth in total hours worked and productivity are virtually the same as CBO's during this time period.



However, the large divergence over the next four years is almost entirely due to my pessimistic assumptions about productivity growth that flow directly from recent experience. Unlike **CBO**, I am not optimistic that productivity will bounce back quickly. Productivity assumptions are shown in **Chart 3**. An examination of productivity is contained in **Section III**.



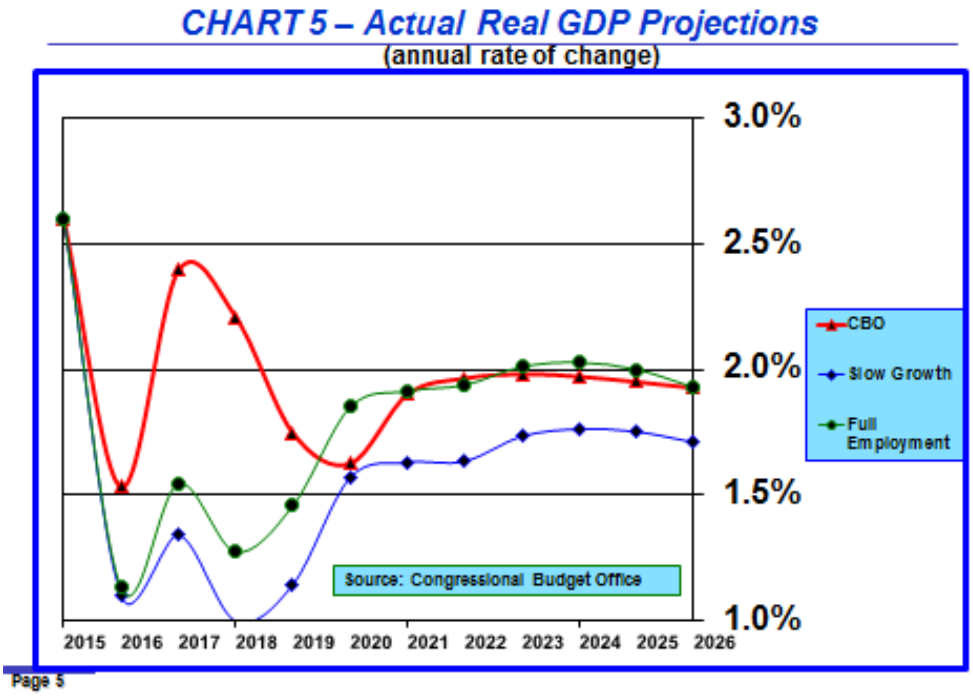
CBO revises its estimates of potential real GDP retroactively as well. This means that the historical output gap, defined as the difference between potential and actual real GDP, can change. **Chart 4** shows **CBO's** calculated output gap for the past few years as well as my estimates for the "**Slow Growth**" and "**Full Employment**" scenarios.



CBO's August 2016 estimate of the 2013 output gap is now 2.74 percent, but in 2012 its estimate of the 2013 output gap was 6.04 percent. Almost all of the decrease in the size of the 2013 output gap has been caused by **CBO's** retroactive reduction in potential real GDP for 2013. I do not attempt to estimate the current output gap, preferring instead to accept **CBO's** measure of the current output gap. I also accept **CBO's** retroactive adjustments. The divergence between my measures of the output gap and **CBO's** measure only occurs in future years and depends on my model's forecasts for actual and potential real GDP. My higher projected output gap results from lower estimates of potential real GDP, as shown in **Chart 2**, but also from even smaller increases in actual real GDP, as shown in **Chart 5**.

3. CBO's Real GDP Estimates for 2017 and 2018 Appear To Be Too High

Notice that my projections for real GDP in my "**Full Employment**" scenario track **CBO's** very closely for 2019-2026, but are substantially below **CBO's** projections in 2017 and 2018. This discrepancy appears to be rooted in **CBO's** slow employment growth assumption, which I incorporate in my analysis of the "**Slow Growth**" scenario, and high productivity, which I do not incorporate in my analysis. While **CBO** indicates that its higher productivity assumption is based on potential, it appears to have used its estimate of potential productivity in calculating its forecast of actual real GDP. One wonders whether there is some reverse engineering at work. **CBO** appears anxious to be able to say that the economy will be at full employment by the end of 2017, but that requires actual real GDP to grow considerably faster than



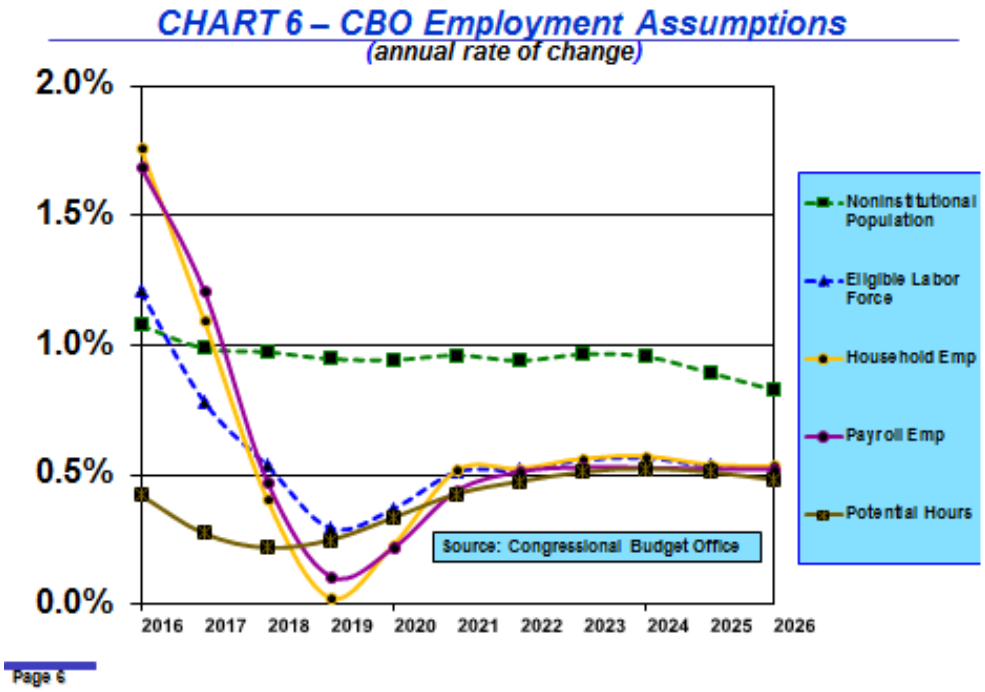
potential over the next six quarters. If that does not occur, then the output gap will remain elevated for a longer period as my scenarios indicate in **Chart 4**. Or, alternatively, as **CBO** has done in recent years, it will simply revise down its estimates of potential real GDP for past years.

4. CBO's Employment Assumptions — A Conundrum

But, the more serious inconsistency in **CBO's** estimates of real GDP in 2017 and 2018 is that its pessimistic employment growth assumptions simply do not line up with its optimistic actual real GDP estimates. **Chart 6** shows **CBO's** assumptions for the non-institutional population, those who are eligible to work and could do so if they wished; the labor force, those who are working or would like to work (includes the U-3 measure of unemployed persons); those who are working (household employment survey); those who are working (payroll establishment survey); and potential total hours worked.

Notice in **Chart 6** that household and payroll establish employment growth declines rapidly during 2017 and 2018 and nears zero in 2019, a time during which **CBO's** estimate of actual real GDP growth is above its potential level.

Moreover, it is unclear why employment growth slows to near zero in 2019 and 2020. During this time period **CBO's** estimate of unemployment rebounds from a better than full employment level of 4.5 percent at the end of 2017 (**CBO** assumes NAIRU full employment is 4.7 percent) to an above full employment level of 5.0 percent at the end of 2019. Perhaps this is simply a case of reverse engineering in the sense that if the unemployment rate is assumed to rise from 4.5 to 5.0 percent over two years' time, then actual employment will have to grow very slowly during that time period. That begs the question of why 5.0 percent. The response to that question is that **CBO** assumes the real GDP output gap stabilizes at 0.5



percent, which means that there is a small amount of slack in the economy. It follows directly that if that is the case, then there should also be a small amount of slack in the labor market. While the logic seems reasonable, the timing of forcing these adjustments into a short time span appears less reasonable.

Also, part of the explanation may be that growth in the eligible labor force is also slowing at the same time — see **Chart 6**. However, the growth slowdown is considerably less for that measure of employment during 2019 and 2020.

Table 2 shows real GDP growth forecasts for the next several years. In comparison with others, CBO's real GDP forecasts for 2017 and 2018 don't appear to be out of line, while mine definitely are outliers on the low end of the scale. Forecasters as a group are overly optimistic about employment growth and simply haven't done their homework to see how a decline in monthly payroll growth to 80,000 will depress real GDP growth. I expect these adjustments to occur once there is actual evidence that payroll employment growth is slowing.

Overly optimistic employment growth is not **CBO's** problem. If anything its assumed payroll growth in 2017 and 2018 is pessimistic. Thus, **CBO's** real GDP estimates should be lower than the consensus estimates and closer to my own. They are not because **CBO** assumes a high rate of productivity improvement, which is possible, but not necessarily probable. Most other forecasters have paid little attention to the importance of productivity in determining real GDP growth and probably assume productivity will remain close to its historical level. To the extent this is a fair critique and if productivity continues to disappoint, the balance of risks — both with respect to employment growth and productivity assumptions — points in the direction of lower realized growth in real GDP than nearly all forecasters are assuming.

Please understand that I am not attempting to make a case for the accuracy of my low real GDP growth

Table 2
Actual Real GDP Growth Rate Forecasts

	2016	2017	2018	2019	2020	2021	2022	2023
CBO	**1.53**	**2.37**	**2.21**	**1.75**	**1.63**	**1.90**	**1.96**	**1.98**
B of A	1.53	2.16	1.84	1.77	1.69	1.69	1.69	1.69
GS	1.51	2.18	2.03	1.87	1.75	1.75	1.75	1.75
Global Insight	1.60	2.40	2.40	2.20	2.30	2.30		
Economy.com	1.60	2.90	2.60					
Blue Chip Average	1.50	2.20	2.20	2.10	2.20	2.10		
Fed High (Q4/Q4)	1.90	2.20	2.10	2.00			Long Term	2.00
Fed Low (Q4/Q4)	1.70	1.90	1.80	1.70				1.70
Slow Growth	1.10	1.34	1.00	1.14	1.57	1.63	1.63	1.73
Full Employment	1.13	1.55	1.27	1.46	1.85	1.91	1.94	2.01
Low Productivity	1.09	1.23	0.96	1.07	1.37	1.44	1.47	1.54

estimates. My estimates are projections that are determined by scenarios. ***They are not forecasts***. They merely fall out of **CBO's** low employment growth assumption and my low productivity expectation. My estimates will prove prescient only if both sets of assumptions are realized. It would be my hope, for the good of the economy and overall economic welfare, that both sets of assumptions are too pessimistic.

5. CBO's Employment Assumptions — Additional Observations

There are other interesting observations about the data in **Chart 6**. Growth in all employment measures converges to approximately 0.5 percent after 2020. Tellingly, however, growth in total hours worked, which is the most critical variable in determining potential real GDP growth, is systematically slightly lower than the other employment measures. Growth in the non-institutional population is the outlier. In a stable employment environment it should be growing at the same rate as the other measures. The fact that it is not means that participation in the labor force is declining steadily over time. This is primarily the consequence of an aging population.

There appears to be another problem with **CBO's** employment projections. As I mentioned above, I rely on some of **CBO's** assumptions to provide the basic economic inputs for my statistical work. Key among them are data about growth in the population and the eligible labor force. I do not use **CBO's** household or payroll employment survey data as basic inputs because these are variables I choose to test in scenario analysis. I do, however, replicate CBO's payroll employment projections in my "**Slow Growth**" scenario. Then, I derive estimates of household employment and the unemployment rate from the payroll data. Payroll and household employment are tightly correlated over time. Without going into the details, CBO's projections of household employment appear to rise too rapidly over time relative to payroll data or perhaps the reverse is true. In any event, this discrepancy does not manifest itself in the early years and thus cannot explain the overestimation of actual real GDP in 2017 and 2018.

In the next two years, according to assumptions published by **CBO** in August, growth in payroll employment is projected to fall to 10,000 monthly from this year's monthly average of 182,000.

There is another possibility, of course, and that is that **CBO's** forecast collapse in employment growth is spurious. My problem is that my base scenario — "**Slow Growth**" — is built using many of CBO's basic economic projections, such as non-institutional population growth, labor force growth, labor participation rates, payroll employment growth, and the full-employment unemployment rate among others.

In its August 2016 update, **CBO** raised its assumed labor force participation rate by 20 basis points in 2016 and 2017, but cut it 50 basis points in the longer run. This change was offset partially by a 10 basis point reduction in the long-run unemployment rate. But, the net effect was to reduce actual and potential real GDP growth by about 10 basis points in the long run.

CBO also reduced its long-run assumed rate of growth in the employment cost index (ECI) by 10 basis points to 3.06 percent.

6. CBO's Interest-Rate Projections

CBO reduced short-term interest rate assumptions to better match market expectations and acknowledge the "lower for longer" expectations that have emerged from a permanently lower neutral rate. It now assumes that short-term interest rates will rise slowly to 0.5 percent by the first quarter of 2017, 1.0 percent by the end of 2017, 1., 2.4 percent by the end of 2019 and edging up further to 2.8 percent in the longer run., 2.4 percent by the end of 2019 and edging up further to 2.8 percent in the longer run. Longer-term rates also rise very slowly and top out at 3.6 percent, which is a 50 basis points reduction from its previous assumption.

7. CBO's Fiscal Projections

Slower economic growth worsens the long-term accumulated federal budget deficit but this is more than offset by reduced debt servicing costs because of lower interest rates. Overall the 10-year aggregate budget deficit is $712 billion lower. This reduction is composed of three components$428 billion in lower tax revenues; $161 billion in lower entitlement spending; and $979 billion in reduced interest costs. This good news, however, does not benefit the public-debt-to-nominal-GDP ratio because nominal GDP growth also is lower.

III. Productivity

Productivity occurs when output increases relative to the same amount of input. Baily and Montalbano define productivity as "... *the efficiency at which inputs are turned into outputs.*"[1]

Expansion of output relative to inputs creates growth that benefits participants in an economy. Productivity increases and improvements in the standard of living are two sides of the same coin. This means that the faster productivity grows, the faster the standard of living will improve.

[1]Martin Neil Baily and Nicholas Montalbano." Why is US Productivity Growth So Slow? Possible Explanations and Policy Responses," paper prepared for the Hutchins Center and Initiative on Business and Public Policy Conference at The Brookings Institution, September 8-9, 2016.

But, examination of the drivers of productivity tends to be a low priority undertaking for most economists. This lack of attention seems inconsistent with the very important role it plays in determining potential real GDP growth and increases in the standard of living. Perhaps the lack of attention is linked to its apparent stability over decades at around 2.0 percent, even though there is considerable year to year volatility, and the presumption that in the modern world pursuit of discovery and new technologies will always enable humankind to become more productive.

1. Measurement of Productivity

It is really difficult to measure productivity. It's not like the rich employment data detail which is relatively easy to collect and analyze. At the aggregate level the simplest measure of total inputs is total hours worked. Historically, output per hour worked and wages have been highly correlated, thus the strong linkage to improvements in the standard of living.

But, embedded in total hours worked are three drivers of improved efficiency. The first is referred to as ***capital deepening*** and involves the amount of capital available to each worker. Simply put, a worker with access to more physical capital can be more productive. The second driver is the ***composition of the labor force*** and involves the education, skills, and experience of workers. More highly educated workers and those with greater experience will be more productive. The third driver is referred to as "***multifactor productivity***" or sometimes as technical progress. Bailey and Montalbano explain that multifactor productivity growth *"... reflects changes in output that cannot be accounted for by changes in input. Multifactor productivity growth occurs through improvements in technology, higher value products and services, and better organization of production."*

As shown in **Table 3**, Bailey and Montalbano decompose nonfarm business productivity into these three components for four time periods, two of which experienced strong growth and two of which experienced weak growth.

Table 3
Historical Average Productivity and Forecasts — CBO, "Slow Growth," "Full Employment," and "Low Productivity"

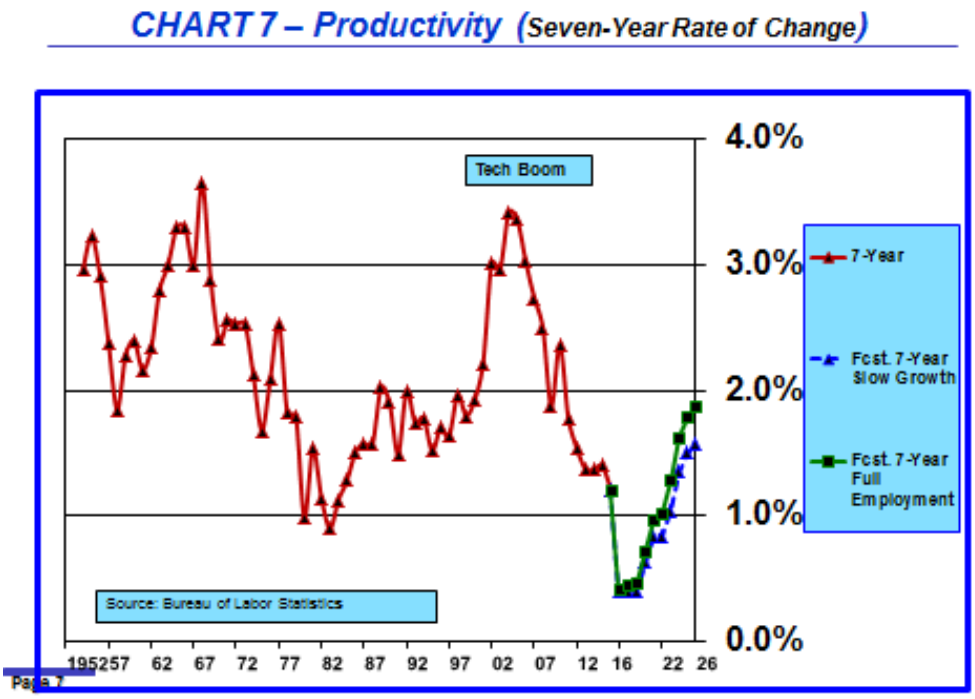
	Capital Deepening	Labor Quality	Multifactor Productivity	Total
1948-1973	1.0	0.2	2.1	3.3
1973-1995	0.8	0.2	0.5	1.6
1995-2004	1.2	0.3	1.7	3.2
2004-2015	0.5	0.2	0.5	1.3

Labor quality contributes the smallest amount to productivity and its contribution has varied little over time. Capital deepening's contribution is larger but relatively stable over the first three time periods. However, capital deepening has plummeted during the most recent time period. That may reflect, at least in part, the growing importance of services relative to the production of goods. But, there are other theories which I summarize below. The greatest variation across the four time periods is in multifactor productivity. Bailey and Montalbano point out that weak multifactor productivity growth and capital deepening are linked and that causality may run in both directions. "*When multifactor productivity is growing slowly, businesses are seeing less reason to invest. When investment is low, there is less opportunity for multifactor*

productivity growth and technology is often embodied in capital."

2. Historical Productivity Growth

Chart 7 shows the 7-year moving average of productivity. The 7-year average was 0.91 percent in the second quarter of 2016, which was lower than all but three quarters in the last 60 years. As the forecast values on **Chart 7** indicate, the 7-year average will fall to an all-time low over the next five quarters as quarters in 2009 and 2010 averaging 4.0 percent productivity growth fall out of the average. Forecasts in **Chart 7** suggest that within the next ten years the 7-year average increase in productivity will return to the pre-tech boom level. But these forecasts are based more on a presumption of a reversion to the mean than on concrete analysis of the drivers of productivity.



Decreasing productivity in recent years is not unique to the U.S. It is a global phenomenon. This implies that there are broad-based structural factors at work. The question of interest is whether these forces can be moderated by adjustments in public policies or whether they are a consequence of the post-industrial global economy and, as such, are relatively immutable. If the latter proves to be the case, then low productivity is likely to be a permanent fixture. This possibility has very negative implications for societies with aging demographics, large social welfare programs and high ratios of debt leverage to total output.

3. Robert Gordon's "The Rise and Fall of American Growth" [2]

For quite some time Robert Gordon, a Northwestern University economics professor, has written papers about the end of the era of transformative technologies which drove high rates of productivity growth. Gordon has now published a 762-page book that documents in rich detail his thesis that no significant transformative technologies remain and as a consequence the recent decline in productivity is not a temporary, but rather a permanent, phenomenon. While innovations continue apace, they are more limited in impact and thus contribute much less to improving living standards than past innovations such as electricity and health care. For example, health care innovations in the past increased life spans enormously; today's health innovations are adding small increments — the major improvements have already occurred. While critics do not want to accept Gordon's dismal assessment, there have been no convincing rebuttals of his theory. Critics prefer to rely on "faith" that we live in a technological age and that by definition means that transformative innovations, whatever they might be, will continue to occur.

4. Mismeasurement

One strand of the debate about the causes of disappearing productivity has centered around the issue of potential mismeasurement with one study arguing that mismeasurement is not a significant problem and **GS** arguing in a rebuttal that the critique is flawed and that understatement of productivity, and thus of potential real GDP growth, is real and significant.

GS starts with the intuitive postulate that we all know that technological advances, such as the iPhone, have transformed our lives and made them more productive. However, productivity data don't reflect this. This is the so-called productivity paradox. **GS** has assembled evidence to support its belief that measured productivity has not captured the benefits of advances in software technology and that the gap between reported productivity and actual productivity has been growing as software applications become an ever greater component of overall economic activity.[3] **GS** recently updated its analysis.[4,5]

Measurement issues are rather arcane, but the simple explanation is that the prices of technology innovations, particularly software, are not being adjusted for quality improvements. Or, put somewhat differently, if you pay half the price for the latest software application update but derive twice the benefits, it has become twice as productive for you at half the cost. In dollar terms you are receiving four times the benefits per dollar spent. This quality improvement should be measured by calculating the real value of output, which requires deflating the nominal price to adjust for the increase in quality.

Measurement is complicated to an even greater extent by the proliferation of free software. The value that users derive at no cost from Facebook and Google is not included in the measurement of GDP. **GS** believes that the exclusion of free digital products from GDP results in a growing understatement of output and, therefore, in the long-term growth in living standards.

[2] Robert J. Gordon. The Rise and Fall of American Growth: The US Standard of Living Since the Civil War, Princeton University Press, 2016.

[3] Jan Hatzius and Kris Dawsey. "Doing the Sums on Productivity Paradox v2.0," Goldman Sachs Economic Research, Issue No: 15/30, July 24, 2015.

[4] David Mericle and Dean Struyven. "Productivity: More Light, More Tunnel," US Economics Analyst, Goldman Sachs Economic Research, April 29, 2016.

[5] Jan Hatzius. "An Update on Productivity," US Daily, Goldman Sachs Economic Research, May 19, 2016.

Overall, **GS** believes that mismeasurement of output understates productivity by 0.5 percent to 0.75 percent annually currently compared to an understatement of about 0.2 percent 15 years ago.

In a recent paper, David M Byrne, John G. Fernald, and Marshall B. Reinsdorf (collectively Byrne et al.) concluded that there is "... *little evidence that the slowdown [in productivity] arises from growing mismeasurement of the gains from innovation in IT-related goods and services.*"[6] With respect to free digital software, Byrne et al. state that "... *many of the tremendous consumer benefits from smartphones, Google searches, and Facebook are, conceptually, nonmarket: Consumers are more productive in using their nonmarket time to produce services they value. These benefits do not mean that market-sector production functions are shifting out more rapidly than measured, even if consumer welfare is rising.*"

GS rejects the arguments of Byrne et al. The debate will continue. Regardless of how the debate is resolved, assuming that it is, if measured productivity is understated by 0.5 percent to 0.75 percent, then potential real GDP is understated by 0.35 percent to 0.50 percent. But because the nominal value of GDP is the sum of dollar-denominated transactions, by definition this would mean that measured inflation would decline by 0.35 percent to 0.50 percent.

If **GS's** analysis is reasonable, and the arguments and metrics appear to be thoughtful and thorough, both real GDP and potential real GDP are understated. The size of the GDP output gap should not be affected. And, the measure of nominal GDP will remain unchanged.

Policy implications of productivity mismeasurement are limited primarily to the overstatement of inflation. Indexing economic activity, such as annual social security benefit adjustments, to an overstated inflation measure will have the consequence of keeping upward pressure on inflation.

Interestingly, Robert Gordon subscribes to the views of others that standard measures of productivity understate economic progress. But he argues that this has always been the case. Thus, because today's innovations have less impact, the mismeasurement problem and understatement of economic progress becomes smaller as well. In other words, he does not dismiss Jan Hatzius's productivity paradox arguments that productivity would be higher if it were measured correctly. Indeed, measured productivity would be higher, but still declining relative to historical levels.

This view is supported by research recently completed by two Brookings Institution economists.[7] Dervis and Qureshi found that "... *the slowdown in productivity was broad-based, and, if anything, was larger in the relatively well-measured sectors such as manufacturing, trade, and utilities.*" For example, productivity in manufacturing averaged 5.2 percent annually between 2002 and 2008 but averaged only 0.6 percent annually between 2011 and 2015. Dervis and Qureshi conclude that "... *shifts in industry composition are not a central part of the story of the productivity slowdown.*" Baily and Montalbano show in their research that 100 percent of the slowdown in productivity since 2004 can be traced to manufacturing and trade — two industries in which productivity is measured in great detail and well.[8]

Stanley Fisher, Vice Chair of the Federal Reserve Board, stated in a recent speech at the Aspen Institute

[6] David M. Byrne, John G. Fernald, and Marshall B. Reinsdorf. "Does the United States Have a Productivity Slowdown or a Measurement Problem?" Brookings Papers on Economic Activity, BPEA Conference Draft, March 10-11, 2016.

[7] Kemal Dervis and Zia Qureshi. "The Productivity Slump — Fact or Fiction: The Measurement Debate," The Brookings Institution, August 2016.

[8] Martin Neil Baily and Nicholas Montalbano. "Why is US Productivity Growth So Slow? Possible Explanations and Policy Responses," The Brookings Institution, September 8-9, 2016, p.13.

that " ... most recent research suggest that mismeasurement of output cannot account for much of the productivity slowdown."[9]

5. Structural Changes Limiting Productivity Improvement

In addition to Gordon's view that significant social and economic transformative innovations cannot be repeated, he believes that structural changes have occurred in the US economy that inhibit the economy from reaching its full technological potential. Others share this view. To the extent that structural impediments exist they are not necessarily immutable. Arguably, policy changes can moderate or eliminate their consequences.

a. Misallocation of Capital to Low Productivity Economic Sectors

In December 2015 the Bank for International Settlements released a working paper, "Labour Reallocation and Productivity Dynamics: Financial Causes, Real Consequences," which, based upon thorough econometric analysis, found that the culprit for the systematic decline in productivity is misallocation of capital.[10]

In their study, Borio et al. included data for 21 countries and six time periods spanning 1979 to 2009. The findings were robust and highly significant statistically. First, the authors found that "... credit booms tend to undermine productivity growth as they occur largely through labour reallocations towards lower productivity growth sectors."[11] This result seems intuitively logical as resources during credit booms move to the low-productivity financial services sector.

Second, and more surprisingly, Borio et al. found that "... labour reallocations that occur during a boom, and during economic expansions more generally, have a much larger effect on subsequent productivity if a crisis follows ... misallocations beget misallocations."[12] The authors added that this knock on effect dominates all others. They do not, however, attempt to explain this very strong statistical finding.

However, the explanation seems to me to be straight forward. The misallocation of capital prompted by a credit boom continues even after the credit boom unwinds and, indeed, is even more severe if a financial crisis accompanies the unwinding of the credit boom. The question is why should the misallocation persist and even intensify. The answer lies in inadequate aggregate demand, a sustained output gap, and low-interest rate monetary policies. The natural rate of interest is far below a now depressed potential growth rate in the economy. Capital continues to be misallocated following a financial crisis with much going into creating a new credit boom that supports price speculation in existing assets rather than financing new productive assets.

There is a ***chilling implication*** of the Borio et al. study and the secular stagnation hypothesis. If secular stagnation persists, then low interest rates, which are well below a depressed potential rate of

[9] Stanley Fischer. "Remarks on the U.S. Economy," Aspen Institute, August 21, 2016.

[10] Borio, Claudio; Kharroubi, Enisse; Upper, Christian; and Zampoli, Fabrizio. "Labour Reallocation and Productivity Dynamics: Financial Causes, Real Consequences," BIS Working Paper No 534, December 2015.

[11] Borio et al. (2015), p. 25.

[12] Borio et al (2015), p. 25.

economic growth, will also continue to persist, misallocation will continued unabated, and productivity will not recover. This would mean that even the depressed long-run potential real GDP growth estimates of 1.7 to 2.0 percent are too high and that actual growth will be much lower in coming years. Unfortunately, low growth, deflation, credit problems, income inequality and a host of other problems are linked.

b. Regulatory Burden

Stifling government regulation is a popular villain accused of responsibility for the productivity slowdown. The objective of regulation is to assure responsible behaviors and to avert potential market failures. However, in pursuing these objectives, there is always risk that regulations will discourage innovation by increasing its cost — think about the approach of the Federal Drug Administration in approving new drugs and medical devices; reduce access to capital and increase its cost — think about the tough capital and liquidity requirements the Dodd-Frank Act imposed on financial institutions; or protect companies from competition in the interest of containing market volatility.

Everyone has a favorite example of the consequences of regulatory burden. The sustained decrease in new business startups brings to mind the Consumer Financial Protection Bureau (CFPB), which was created by the Dodd-Frank Act to protect consumers from egregious practices involving the provision of financial services.

When it comes to the provision of consumer financial services there are three objectives — fair access to credit, reasonable and defensible cost of credit, and protection from abusive practices. The problem is that regulation cannot achieve optimal outcomes for all three of these objectives simultaneously. If the regulator chooses, as the CFPB has done, to emphasize consumer projection, the regulations designed and promulgated to achieve this objective will necessarily increase the cost of compliance and thus the cost of credit to consumers and will reduce access to credit by discouraging lenders from providing credit to higher risk categories of borrowers. The reason that this might be important to innovation is that many small startups are financed by credit card debt and second equity home loans. In the aftermath of the Great Recession and with the regulatory approach the CFPB has chosen to take, access to consumer debt is both more limited and more expensive. It is unlikely that this is the sole or even the primary reason for the dearth in new startups, but it is a logical contributing factor.

And, there is the more cynical explanation of regulatory-business cronyism that protects established firms and makes life difficult for startups and small firms.

c. Weakening of Technological Diffusion

Labor skill mismatches and constraints on the supply and demand for investment capital could be slowing the diffusion of innovations and thus retarding the rate at which new innovations boost productivity. Constraints on the supply of investment capital can come from tighter credit underwriting. Constraints on the demand for investment capital can stem from doubts about sales growth in a low nominal growth era or less attractive and more uncertain rates of return. Uncertainty about the "rules of the game" can cause businesses to defer investment decisions. The current presidential election campaign might be a contributing factor. A National Federation of Independent Business survey indicates that a net of 39

percent of small business owners believe it is not prudent to expand their business in the current political climate. This is the higher level ever recorded in this survey.

d. Business Dynamism

Business dynamism refers to market competiveness. It involves the extent to which the forces of creative destruction operate in the marketplace. Business dynamism is governed by ease of entry of new firms and by the extent of market aggregation by existing firms in ways that block new entrants and create cozy markets for existing participants that limit rigorous competition and innovation.

Andrews, Criscuolo and Gal conducted research that found frontier (leading edge) companies improved their efficiency but others in their industry did not.[13] Over time a large and persistent gap opened up between the frontier companies and other companies in the industry. Something blocked the transference of productivity enhancing methodologies from the frontier firms to others while simultaneously enabling the laggard companies to continue in business. This finding was particularly prevalent in service industries but was evident in other industries as well. The findings suggest the problem is not a lack of innovation but a lack of effective diffusion of innovation. Another troublesome finding was that the gap between the frontier firms and the rest of the industry has been widening over time.

One possible explanation for this productivity-slowing phenomenon is monetary policy, which by depressing nominal interest rates below their natural rate enables zombie companies to stay in business by issuing inexpensive debt. Another explanation may be that modern technologies tend to create natural monopolies, particularly in broad-based services markets, which make it nearly impossible for startups to be successful. Walmart, Amazon.com, Facebook, and Google serve as examples.

e. Decline in Startups

Data collected by the Census Bureau show a clear and substantial decline in the rate of formation of startup companies in recent years. This is troublesome for two reasons. First, it is well understood that new firms are better at exploiting productivity enhancing technologies and methodologies. Thus, the correlation between the decline in startup activity and productivity is probably causal. Second, while new firms account for only 2 to 3 percent of total employment, they account for approximately 15 percent of the increase in employment. **B of A's** research indicates that if new firm formation had remained at the average rate that prevailed from 1990 to 2008, between 756,000 and 1.57 million additional jobs would have been created between 2009 and 2014. New startup firms are engines of economic growth. So, fewer startups are not a desirable outcome.

B of A suggests several possible reasons for the persistent decline in the number of startups including, tighter credit availability, greater policy uncertainty, aging demographics, and technology disruptions — for example, chain retailers systematically replacing "mom-and-pop" retailers.

[13] Dan Andrews, Chiara Criscuolo, and Peter N. Gal. "Frontier Firms, Technology Diffusion and Public Policy: Micro Evidence from OECD Countries," OECD Productivity Working Papers, 2015-02, OECD Publishing, Paris.

f. Aging Demographics

As the population ages, its most productive workers retire. This has an adverse compositional impact on labor productivity. Because the contribution of labor quality is small to begin with, this structural change is unlikely to be very significant. It has been suggested, however, that demographic trends could account for as much as 70 basis points of the decline in productivity.

g. Income and Wealth Inequality

Growth in income and wealth inequality play a role in limiting productivity growth in a couple of ways.

Spending is a function of income. Lower income people spend a much greater percentage of their incomes on consumption than higher income people. It follows that if the income inequality gap widens, consumption spending should grow more slowly than income. To the extent that this occurs, demand for goods and services grows more slowly and that, in turn, depresses new investment. Lack of demand is part of the secular stagnation theory.

Wealth inequality, particularly in a time when monetary policy has intentionally depressed interest rates below their normal market equilibriums, stimulates investment in existing assets rather than investment in new productive assets. This occurs because returns on existing assets are less risky than returns on new ventures and are virtually a slam-dunk as long as central banks artificially peg interest rates at below market levels. Thus, the very monetary policies that are intended to spur investment actually have the opposite result and this phenomenon contributes to slower productivity growth.

h. Infrastructure Investment

Certain capital investments are too large or too risky for private firms to handle. There has always been a strong argument for public investment in infrastructure that will provide an economic foundation for more rapid growth. This has been especially true for transportation infrastructure. But it is also true for research and development work that is expensive and might not have immediate commercially profitable applications. Government investment has fallen steadily over decades as a percentage of GDP and its rate of growth has been persistently below the rate of growth in real GDP.

Several statistics make the case for more government investment spending. Over the last 70 years, real government investment spending has grown 2.64 percent annually compared to 3.15 percent annual growth in real GDP. Since 1947 government's investment spending has declined from 24.9 percent of real GDP to 17.5 percent. Over the last 17 years from 1999 to 2016, real government investment spending has risen only 1.06 percent annually compared to 1.96 percent annual growth in real GDP.

Not surprisingly, the average age of government infrastructure has risen from 18 years in the 1950s to 27 years in 2014.

But, more importantly, my statistical analysis indicates that each one percentage point growth in federal and state and local investment spending raises nonfarm business productivity by 45 basis points

over an average of 9 quarters. This relationship suggests that productivity could be as much as 70 basis points higher currently if government investment spending were growing at the long-term average of 2.64 percent.

i. Rising Government Debt

Growth in the ratio of public debt to nominal GDP is not necessarily a direct limiter of productivity growth. However, if the size of the debt creates political pressures to restrict borrowing, thus limiting spending, productivity can become an indirect casualty.

There is a broader public policy question, however. Like all entities the government cannot spend without limit without creating undesirable consequences. The policy choice comes down to how to allocate limited resources to entitlement spending, investment spending, and other public purposes. As a matter of public policy the political choice we have made over decades has been to devote an increasing portion of available resources to entitlement spending. The demographic trends of aging will reinforce this trend in coming years. The consequence of this political choice has been to reduce resources available for government investment spending and the consequence of that, arguably, has been slower real economic growth.

Now, here is the policy connection. Investment spending, by boosting productivity and real economic growth expands the pool of resources available to the government over time. A little less to entitlement spending today and a little more in investment spending should lead to a larger pool of resources over time to support greater entitlement spending in the future. This is a policy pathway we and other developed nations did not choose to pursue. We focused on entitlement spending and now find ourselves with ever growing spending commitments as the population ages coupled most unfortunately with slowing real growth and with it a shrinking pool of available resources.

6. Possible Policy Responses

Now that more effort is being devoted to trying to understand the causes of the productivity slump, the next stage is to develop and debate the efficacy of policy responses intended to boost productivity. Below is a partial list of general policy categories. Discussions and research will help flesh out concrete policy proposals.

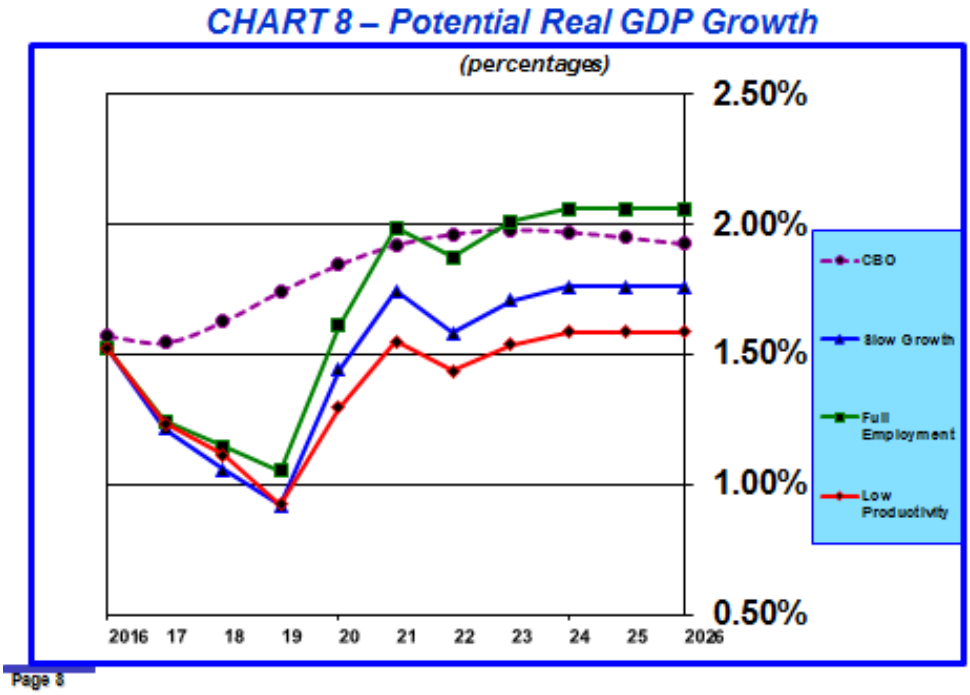
- Increase competitive intensity
- Simplify and rationalize economic regulation
- Improve managerial capability and adopt best practices
- Invest in development of worker skills
- Stimulate productivity through government investment in infrastructure
- Support research and development in 3D printing, robotics, and other cutting edge technologies

In an otherwise dismal story, the good news is that the "productivity problem" is no longer being denied as a transitory phenomenon that will soon go away. There is still a lot of hopeful thinking that matters will improve in coming years. But, that is by no means certain and in any event, it would be foolish to lose valuable time by waiting and hoping for such an outcome. Thus, it is important for research to continue and for policies to be proposed, vetted, and tested. The good news is that this is beginning to happen and policymakers are already beginning to migrate away from their love affair with neo-economic liberalism.

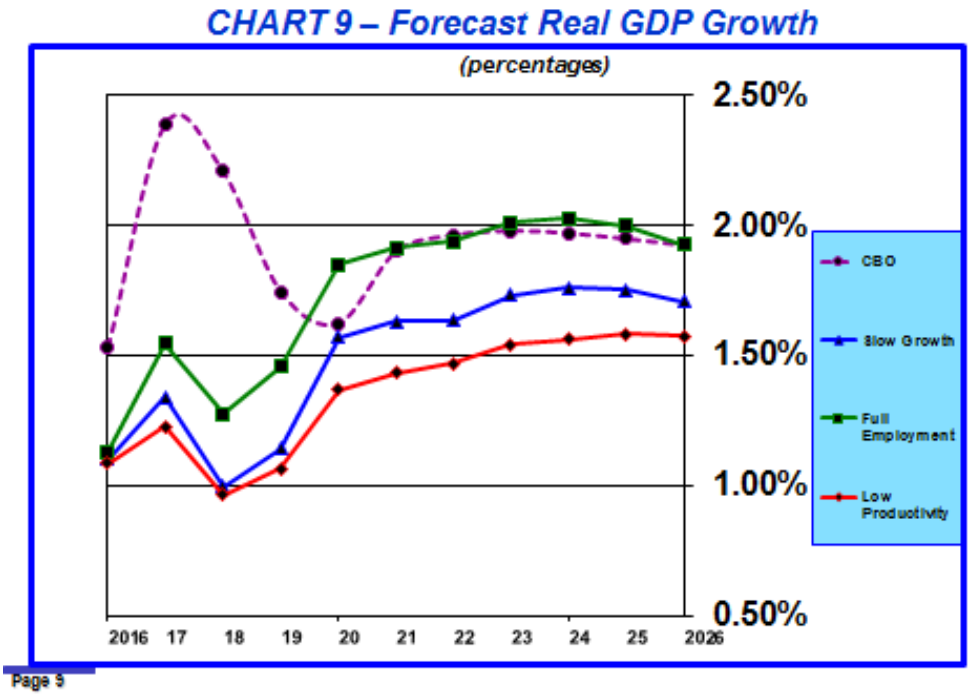
7. Economic Implications of Sustained Low Productivity

In the following charts, I compare three economic scenarios — "Slow Growth," "Full Employment," and "Low Productivity." The precision of the estimates is of far lesser importance than the comparative differences between the scenarios.

Comments below each of the charts address the consequences of persistently low productivity.



Because the level of productivity helps determines the potential rate of growth in real GDP (**Chart 8**), persistently lower productivity naturally results in lower potential real GDP growth.



Persistently low productivity also depresses actual real GDP growth (**Chart 9**); however, the output gap is not affected because both potential and actual real GDP decline.

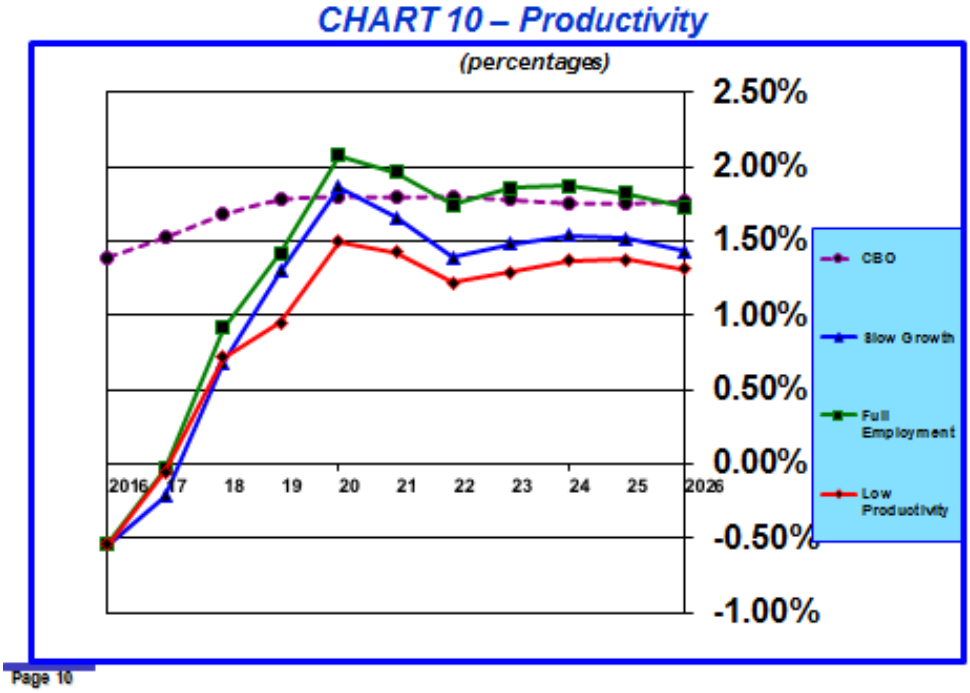


Chart 10 shows the assumed values for productivity for the different scenarios.

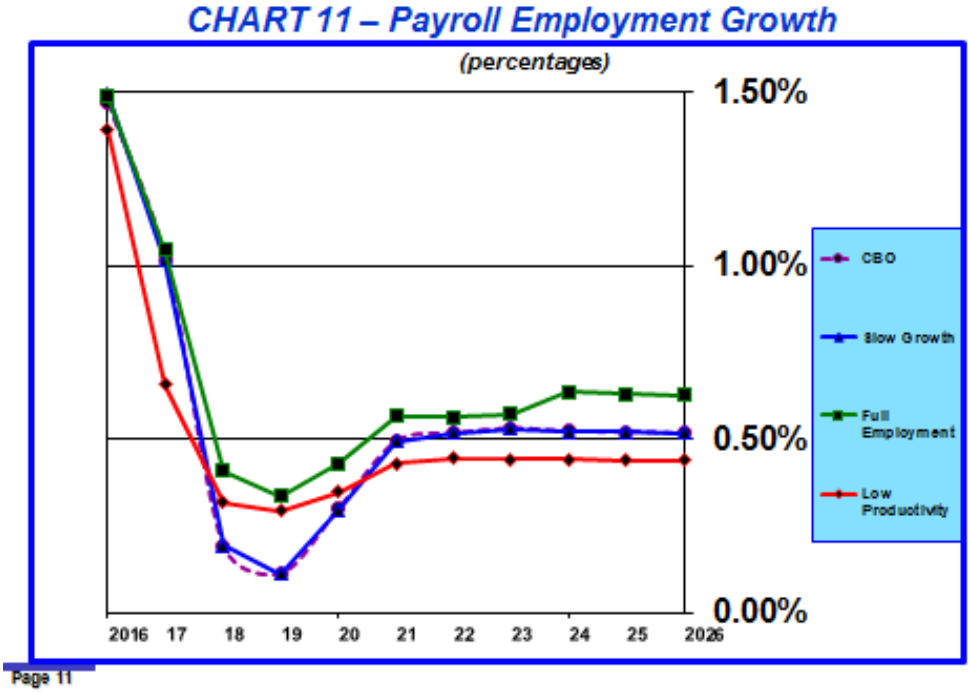
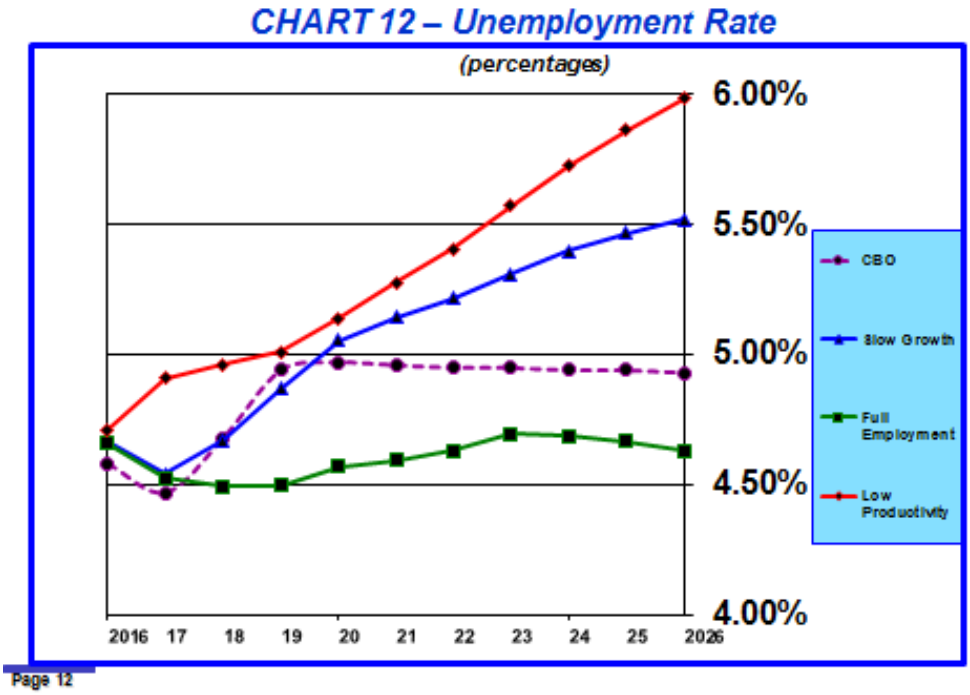
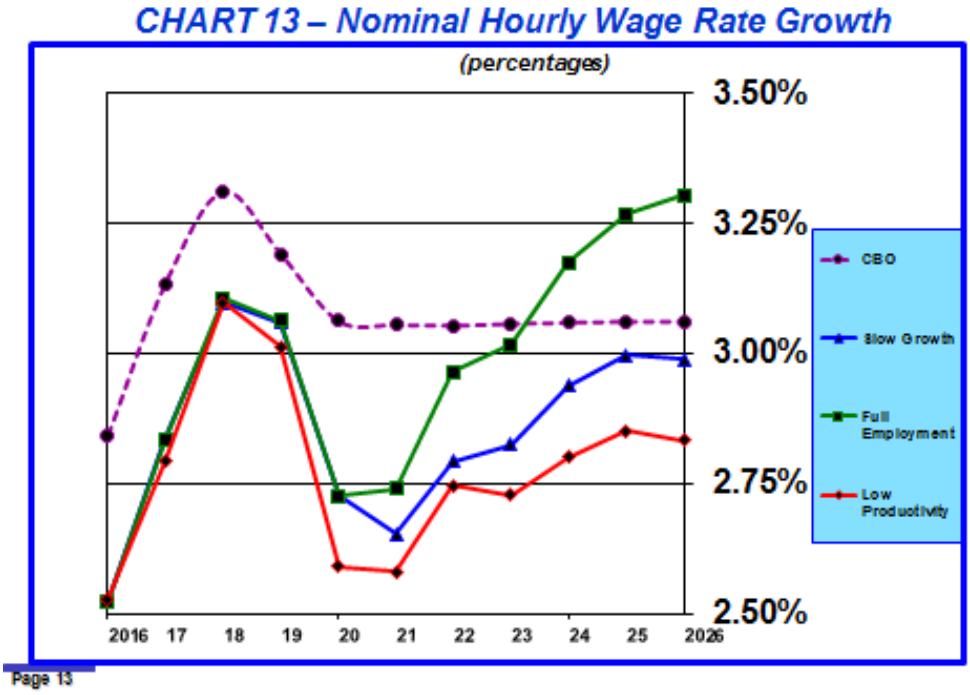
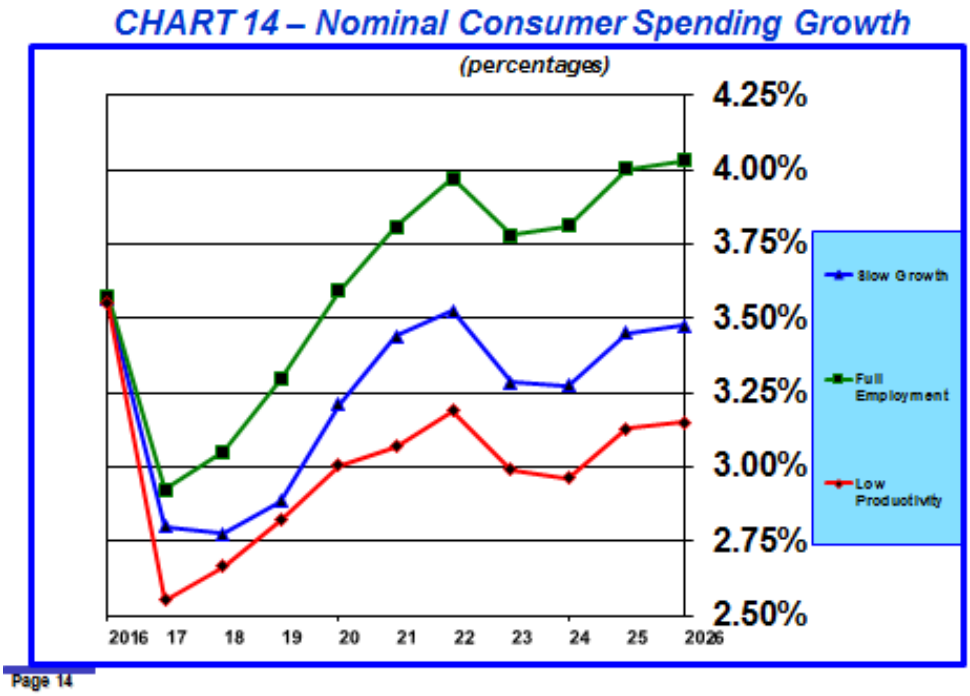


Chart 11 shows how the "**Slow Growth**" scenario matches **CBO's** payroll growth assumptions. The other two scenarios do not depress payroll employment nearly as drastically in 2018, 2019, and 2020. Over the long run, persistently low productivity growth depresses payroll employment growth — higher productivity does help create jobs. The impact on the unemployment rate is substantial.

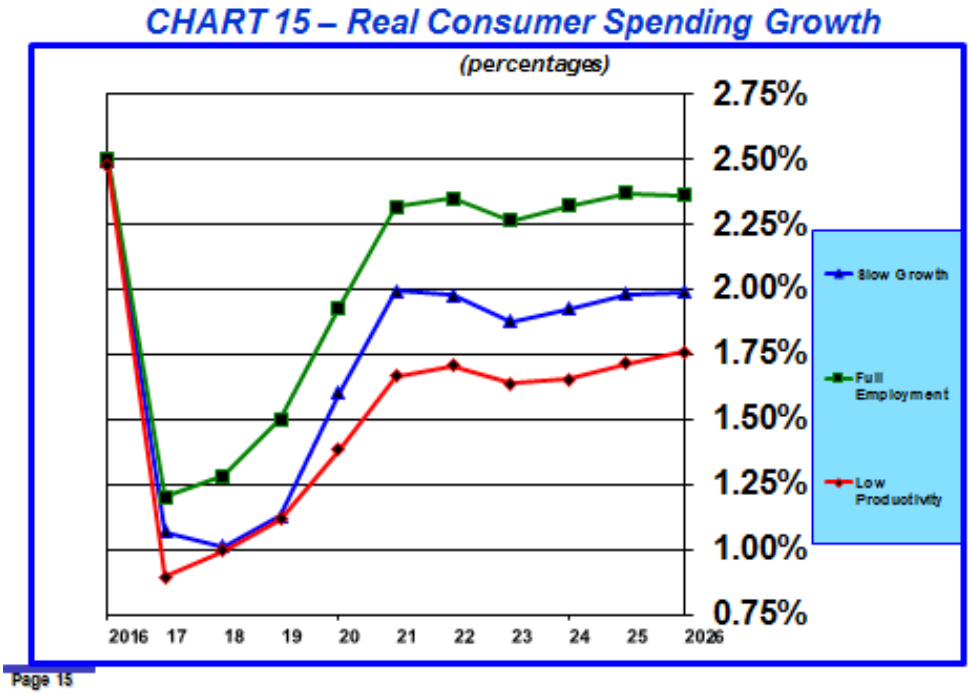


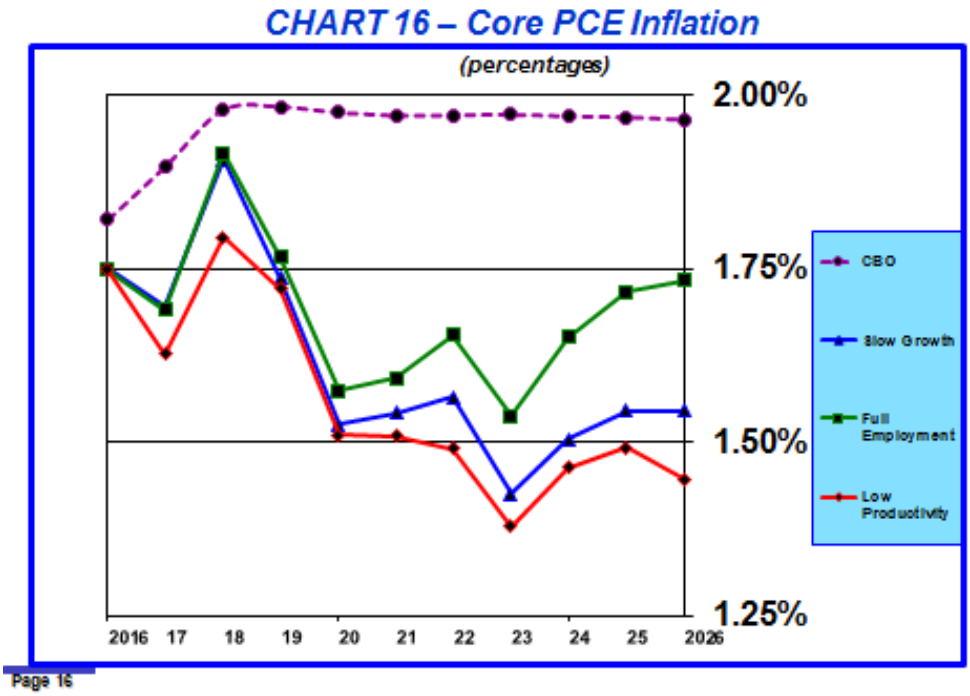


Higher unemployment, slower employment growth and lower inflation inhibit wage rate growth (**Charts 12** and **13**).

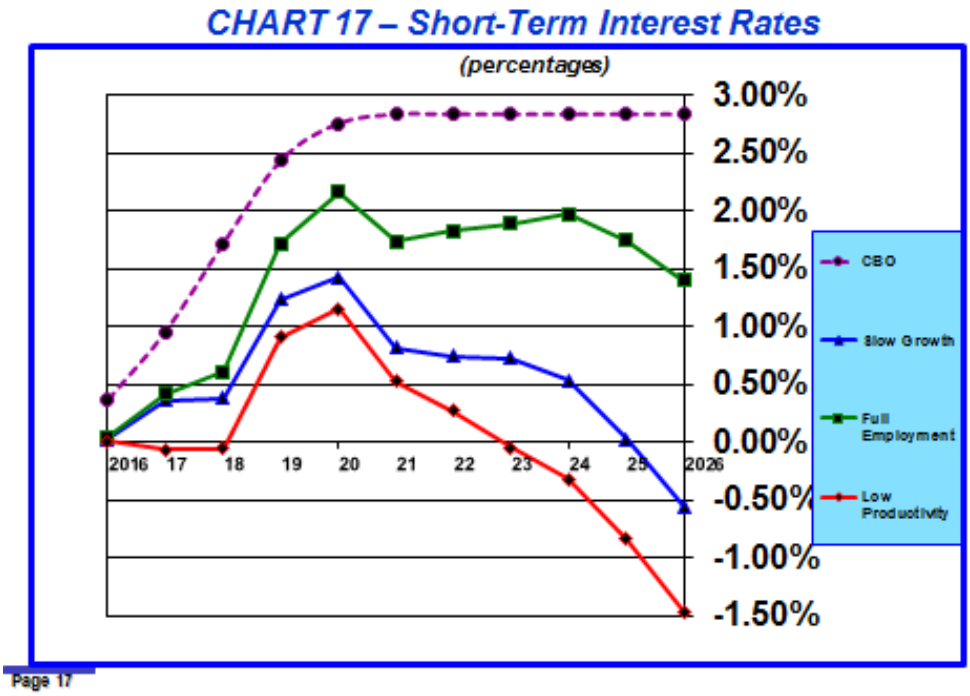


Nominal consumer spending growth is depressed by slower employment growth (**Chart 14**), lower inflation and smaller increases in housing and stock prices. The same is true for real consumer spending growth.

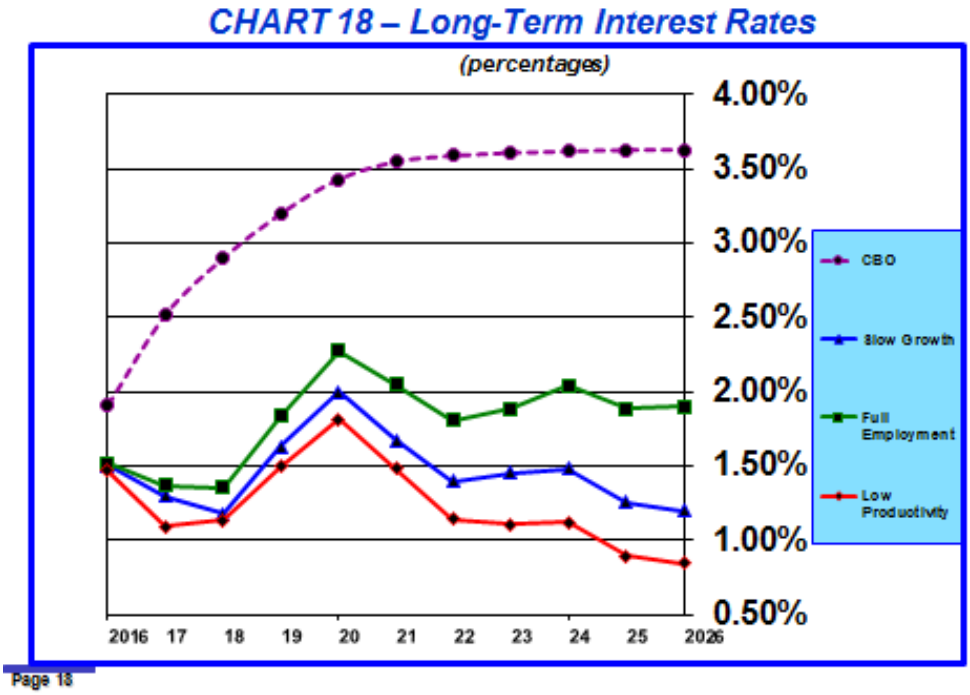




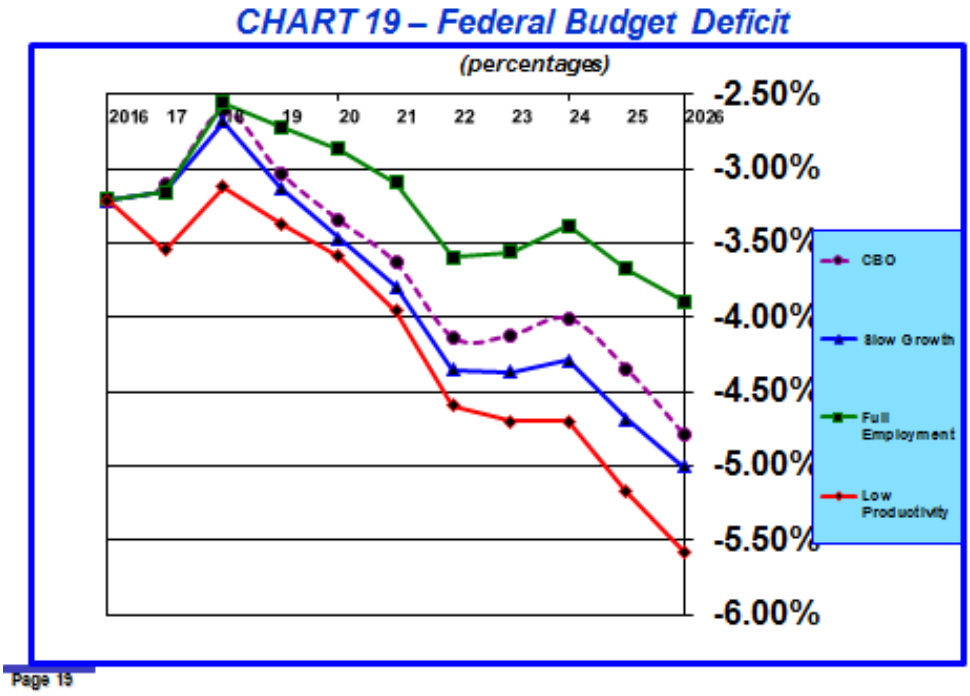
Slower employment growth, lower productivity, and a higher unemployment rate have a moderate negative impact on inflation (**Charts 15** and **16**).



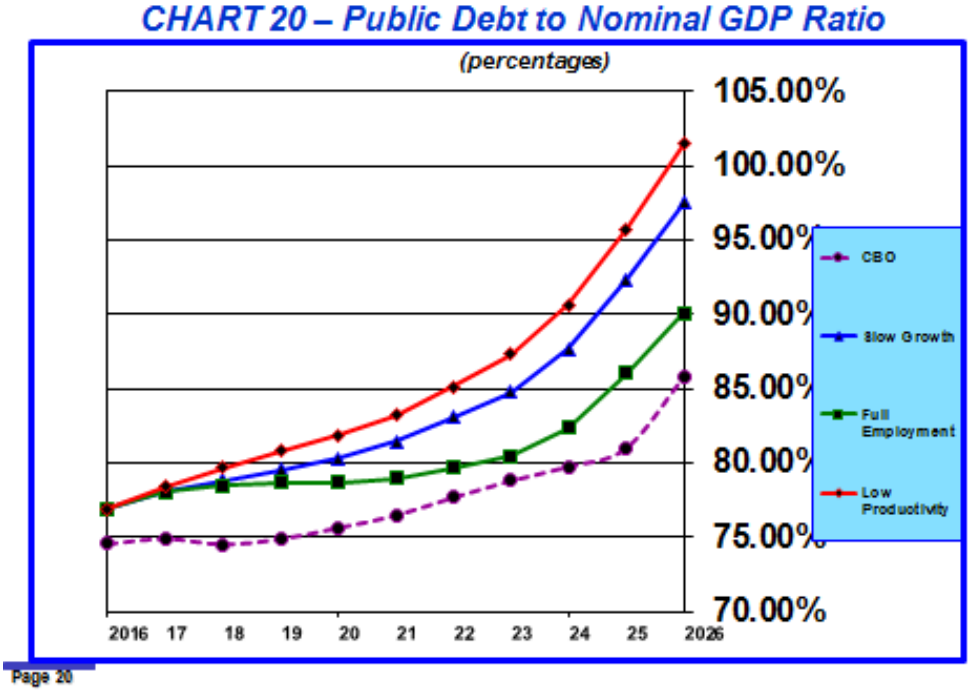
Persistent high unemployment pushes short-term rates back to zero (**Chart 17**).



The natural rate of interest falls and long-term interest rates decline gradually (**Chart 18**).



Annual budget deficits risk in all scenarios but are worse for scenarios that experience slower employment growth and lower inflation (**Chart 19**).



The public-debt-to-nominal-GDP ratio naturally rises over time (**Chart 20**). **CBO's** estimates benefit from its assumption that nominal GDP grows faster.

IV. Real GDP

Revisions to real GDP and the "**Preliminary Estimate**" of second quarter GDP left growth at a disappointingly low 1.7 percent over the last four quarters. Because of substantial and unanticipated inventory liquidation, second quarter real GDP came in at a very disappointing 1.2 percent in the "**Advance Estimate**" and was revised down to 1.1 percent in the "**Preliminary Estimate**." Forecasters had expected second quarter growth to be in a range of 2.5 percent to 3.0 percent. Changes in inventories, which are often extremely volatile on a quarterly basis, subtracted 1.3 percent from real GDP. **Final Sales**, which eliminates changes in inventories, grew a respectable 2.4 percent in both the "**Advance**" and "**Preliminary**" estimates.

Markets quickly discounted the topline GDP number as a non-substantive aberration and ignored declines in housing and business investment growth and above trend consumer spending growth, which is probably unsustainable. Also, what no one seemed to want to recognize, at least not publically, is that real GDP growth momentum has been decelerating for the past six quarters.

We are experiencing one of those times when the market uncritically accepts explanations for why weak economic reports should be discounted. Such is the market's love affair with low interest rates and ample liquidity curtesy of global central banks.

1. "Preliminary Estimate" of Second Quarter GDP

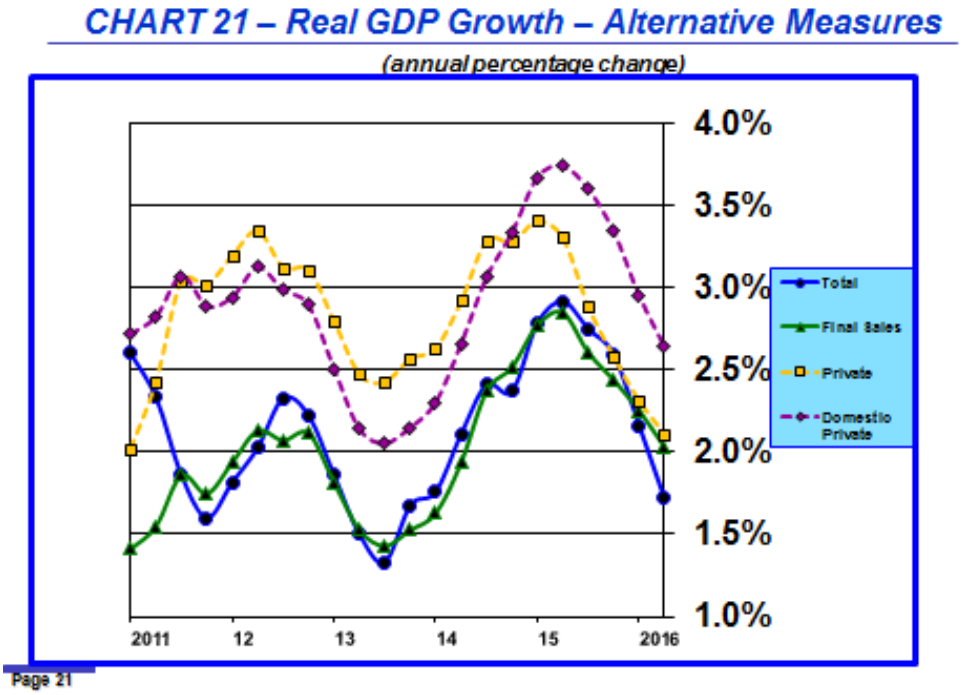
Annualized second quarter real GDP growth in the "**Preliminary Estimate**" rose slightly to a still disappointing 1.2 percent. Alternative GDP measures, shown in **Table 4** and **Chart 21**, reveal that the economy is a bit stronger than the topline number suggests. "**Final Sales**" omits inventory changes which tend to be volatile over the cycle, rising when the economy slows and falling when the economy accelerates. This measure of real GDP remained about the same in the "**Preliminary Estimate**" because the decrease in **Total** GDP was offset by a similar decline in inventory accumulation. Still, the 2.36 percent annualized rate of growth was the strongest in the last four quarters.

"**Private**" GDP omits both inventory changes and government investment spending. Growth in government expenditures rises during periods of economic weakness and falls during periods of strength or when fiscal austerity is the order of the day. Growth in **Private** GDP was greater than growth in **Total** GDP during 2011, 2012, 2013 and 2014, a period when fiscal policy was contractionary. Since 2015 fiscal policy has been mildly supportive of **Total** real GDP growth. Annualized **Private** GDP growth improved by 9 basis points to 2.63 percent in the "**Preliminary Estimate**" because the increased negative contribution of government investment spending to GDP is omitted from this measure.

"**Private Domestic**" GDP omits inventory changes, government investment spending and net exports. Since mid-2014 net exports have depressed **Total** real GDP growth. That development has flowed directly from the stronger dollar and is corroborated by the slowdown in industrial production and manufacturing, which are more directly linked to international trade than other sectors of the economy. Annualized **Private Domestic** GDP growth improved 12 basis points to 2.53 percent in the "**Preliminary Estimate**" because the increased contribution of net exports to GDP is omitted from this measure.

Table 4
Composition of 2016 and 2015 Quarterly GDP Growth

	Second Quarter 2016 Advance Estimate	Second Quarter 2016 Preliminary Estimate	Second Quarter 2016 Final Estimate	First Quarter 2016	Fourth Quarter 2015	Third Quarter 2015
Personal Consumption	2.83%	2.94%		1.11%	1.53%	1.81%
Private Investment						
Nonresidential	-.28%	-.11%		-.44%	-.43%	.49%
Residential	-.24%	-.30%		.29%	.40%	.43%
Inventories	-1.16%	-1.26%		-.41%	-.36%	-.57%
Net Exports	.23%	.10%		.01%	-.45%	-.52%
Government	-.16%	-.27%		.28%	.18%	.34%
Total	**1.22%**	**1.10%**		**.84%**	**.87%**	**1.98%**
Final Sales	**2.38%**	**2.36%**		**1.25%**	**1.23%**	**2.55%**
Private	**2.54%**	**2.63%**		**.97%**	**1.05%**	**2.21%**
Private Domestic	**2.31%**	**2.53%**		**.96%**	**1.50%**	**2.73%**



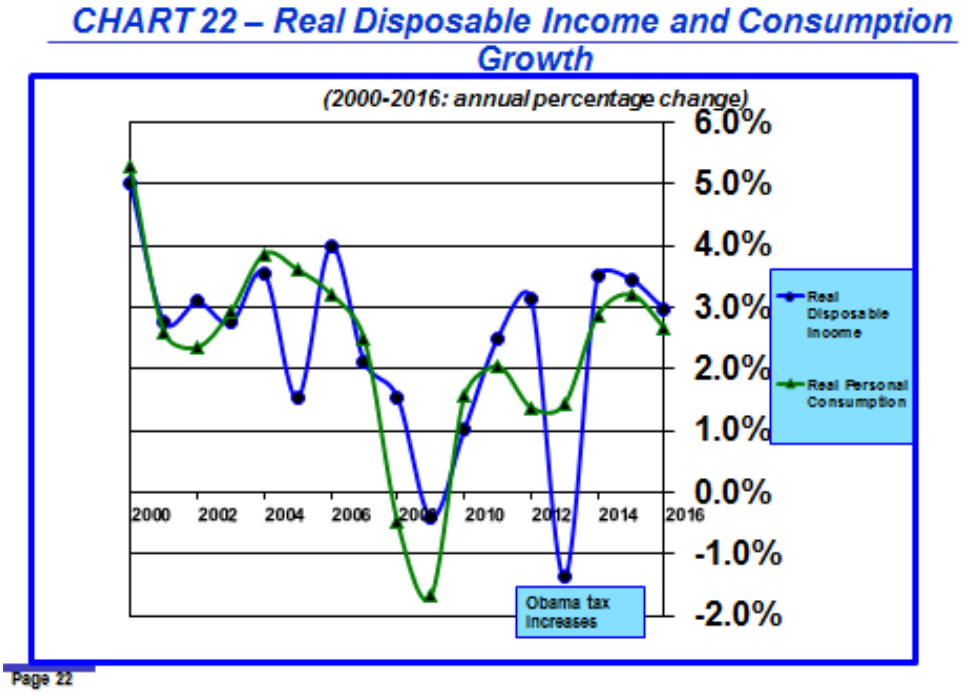
There are three important takeaways from **Chart 21**. First, all four measures of real GDP growth peaked in either the first or second quarter of 2015 and have steadily decelerated since then. Second, "**Private GDP**" growth, which omits government spending and inventory accumulation, had been growing more rapidly but has converged with the "**Total GDP**" growth rate in recent quarters. This is due to growth weakening in the private sector rather than strengthening in the government sector. Third, "**Total**

GDP" growth has been consistently dragged down by a higher growth rate in net foreign sales. This differential has worsened in the last two years because of strong dollar appreciation that has boosted domestic demand for imports and depressed foreign demand for exports.

2. Consumption

Personal consumption contributed 2.94 percent to second quarter real GDP growth, which is the strongest quarterly contribution since 3.07 percent in the fourth quarter of 2014. However, this was offset by weak 1.11 percent growth in the first quarter, which was the worst quarterly growth rate since the second quarter of 2013.

In the long run, growth in nominal disposable income and consumer saving preferences determine growth in nominal personal consumption. Nominal disposable income depends upon a lot of things but the most important ones are the level of employment and wage rates. Slow growth in employment and in wage rates will result in slow growth in disposable income. As can be seen in **Chart 22**, over the last year and a half growth in both real disposable income and personal consumption has slowed slightly. This pattern is reflective of a gradual subsidence in the overall rate of economic growth and mirrors the pattern of slowing real GDP growth shown in **Chart 21**.



Other indicators are sending a similar message of a gradual deceleration in consumer spending growth. Car sales have been soft and dealer inventories have been building. A parallel development is a slowdown in state retail sales tax receipts over the last year.

Forecasts of growth in real consumer spending are shown in **Table 5**. With seven months of data reported, forecast growth for 2016 has converged to a narrow range of 2.5 to 2.7 percent. Close assessment

of the data argues in favor of the lower end of that range. That is because consumer spending exceeded its trend level by a substantial amount in the second quarter, thus boosting the reported annualized second quarter growth rate. This is corroborated by weak retail sales growth in July and August, which is entirely consistent with a return to trend level growth.

Table 5
Real Personal Consumption Growth Rate Forecasts

	2012	2013	2014	2015	2016	2017	2018	2019
Actual	1.38	1.43	2.88	3.21				
B of A					2.66	2.54	2.01	1.79
GS					2.63	2.63	2.20	1.87
Global Insight					2.70	2.60	2.30	2.60
Economy.com					2.70	3.20	3.10	
Blue Chip Average					2.60	2.50	2.30	2.20
Bill's Slow Growth					2.49	1.07	1.01	1.13
Bill's Full Employment					2.50	1.20	1.28	1.50

However, what is really important to explain in **Table 5** is the large divergence in future years between consensus forecasts for real consumer spending growth and those that fall out of my "**Slow Growth**" and "**Full Employment**" scenarios. With the exception of Economy.com, which seems perennially overly optimistic, other forecasters expect the real rate of consumer spending growth to decelerate in coming years. There is a logical reason for this expectation. Consumer spending growth depends primarily on consumer disposable income growth and the two most important determinants of consumer disposable income growth are growth in total hours worked and growth in hourly wage rates.

In the next two years, according to assumptions published by **CBO** in August, growth in payroll employment is projected to fall to 10,000 monthly from this year's monthly average of 182,000. Because the average length of the workweek has been contracting recently, it is quite possible that growth in total hours worked in two years' time will be zero or negative. Doing the math, either it would take an astronomical acceleration in hourly wage growth or a collapse in the saving rate for these forecasts of consumption growth to be reasonable.

There is another possibility, of course, and that is that **CBO's** forecast collapse in employment growth is spurious. The reason my estimate of real consumer spending growth is so slow is that my "**Slow Growth**" scenario is built using many of **CBO's** basic economic projections, such as non-institutional population growth, labor force growth, labor participation rates, payroll employment growth, and the full-employment unemployment rate among. So, if my projections of consumption spending growth appear to be outlandishly pessimistic, it is because I relied on **CBO's** basic economic assumptions.

Over the longer run growth in real consumer spending follows growth in employment and growth in real wages. Now that the economy is very close to full employment, employment growth is set to slow to match underlying demographic dynamics. This is why all forecasters expect real consumer spending growth to slow in coming years.

In summary, because it is likely that employment growth will slow in coming months and because the cyclical components of consumer spending, such as auto sales, are deteriorating, the contribution of

consumer spending to real GDP growth is likely to decline. In combination with weakening growth in trade and investment, this does not bode well for robust real GDP growth in coming quarters.

3. Investment

Real private investment consists of three principal categories — business investment, which is labeled "non-residential" in the National Income Accounts, residential investment, and changes in inventories. While changes in inventories are volatile from quarter to quarter, over the very long run growth in inventories generally tracks growth in business and residential investment.

Table 6 shows growth rates for real private investment and separately for two of its three principal components — nonresidential (business) and residential investment. Residential investment is 20 percent of total investment, nonresidential investment is 77 percent, and growth in inventories accounts for approximately 3 percent.

Table 6
Real Private Investment (Residential and Nonresidential) Growth Rate Forecasts

	2012	2013	2014	2015	2016	2017	2018	Ave. 1947-2016
REAL PRIVATE INVESTMENT								
Actual	9.78	5.02	5.54	3.90				**3.71**
B of A					0.59	2.22	2.91	
GS					0.80	3.27	3.93	
Bill's Slow Growth					0.05	1.17	2.17	
Bill's Full Employment					0.23	2.21	3.03	
REAL NONRESIDENTIAL INVESTMENT								
Actual	8.98	3.50	6.04	2.07				**2.34***
B of A					-0.49	2.13	2.77	
GS					-0.47	2.73	3.29	
REAL RESIDENTIAL INVESTMENT								
Actual	13.51	11.88	3.49	11.70				**-0.33***
B of A					4.83	2.52	3.41	
GS					5.76	5.23	6.20	

*Average 1999-2016; real private investment = 1.38% for 1999-2016

Nonresidential investment (business) growth was crushed in 2015 by the collapse in oil prices. Energy investment has continued to decline in 2016, but investment is down in other sectors as well. As a result, most forecasters now expect nonresidential investment growth will be negative in 2016, followed by a recovery in 2017 and 2018 to a level in 2018 slightly above the trend of the last 17 years. Optimism about investment growth, about which I have been consistently skeptical, has faded to a considerable degree. Slower growth in manufacturing is a contributing factor.

B of A has developed a model that explains business investment growth which can be used to produce forecasts. The model is driven by three variables — corporate profits (National Income Accounts data with adjustments), credit conditions (Baa-Aaa corporate bond spread), and policy uncertainty. Based on its model, **B of A** concludes that business investment is similar in this expansion cycle to previous ones. In

other words, the shift in the composition of economic activity toward services and software and away from manufacturing and mining (oil exploration) has not had any meaningful impact on business investment activity.

B of A is optimistic about the outlook for business investment because it expects those three drivers to improve. Most important is an expected recovery in corporate profits based on better energy company profits due to higher oil prices in recent months. Some skepticism is in order. First, oil prices bounced upward after crashing at the beginning of the year, but have retreated some in the past few weeks. Second, profit pressures appear to be building in other industries. Credit conditions have improved thanks to active easing by global central banks but given the fragility of global financial markets, this improvement could reverse at any time.

But a more important potential weakness in **B of A's** business investment model is possible cumulative negative effects over time of low interest rates and depressed innovation, as reflected in a slower rate of new business formation.

I continue to expect business investment growth in coming years to be not much different from the 2.34 percent growth rate that has prevailed since 1999. This is partly because of the much slower growth rate in the economy but is also impacted by the continuing shift in the composition of economic activity toward services, which are less capital intensive.

Residential investment growth was very strong in 2015. Growth in 2016 promises to be considerably slower, although still respectable. Housing inventories are lean and demand is relatively strong, resulting in upward pressure on housing prices. However, outsized housing price increases will eventually dampen single-family residential demand and inventories should improve with the consequence that residential investment growth should slow in coming years. Generally, forecasts reflect this scenario.

4. Net Exports

In the "**Preliminary Estimate**" net exports contributed 0.10 percent to second quarter real GDP growth. This reversed the negative trend that emerged in 2014 and 2015 as the dollar strengthened (see **Table 4**).

Although the trade deficit in goods and services has been relatively stable, falling slightly from 2.70 percent of GDP in January 2014 to 2.66 percent of GDP in July 2016, the shares of both imports and exports as offsetting components of GDP have declined. Exports have declined from 9.64 percent to 8.10 percent of GDP since January 2014. Over the same period imports have declined from 13.88 percent to 12.08 percent of GDP.

Part of the decline in imports is related to the collapse in energy prices, but part is also due to a world-wide decline in trade. The decline in global trade does not appear to be a temporary phenomenon. The declining trend is traceable at least in part to technological advances and the related shift in economic activity toward knowledge-based services, which generally are located near the point of consumption. The decline in trade is not limited to the U.S.; it is a global phenomenon.

5. Government Investment

Government investment subtracted 0.27 percent from second quarter real GDP growth. Federal government spending deducted .02 percent and state and local spending provided the remaining decline of 0.25 percent.

Government spending ceased to be a negative factor for real GDP growth in 2015 as it had been since 2010. And, even though the "**Preliminary Estimate**" indicates a decline in government spending in the second quarter of 2016, government spending is unchanged over the first six months of 2016. Government investment spending has grown at an annual rate of 1.45 percent over the last six quarters, largely due to strong increases in spending at the state and local level. This may be about as good as it will get unless Congress abandons the constraints of the Budget Control Act.

Table 7 shows recent growth rates in government spending and forecasts for 2016-2019. Note that **GS** is forecasting that the negative trend in federal government investment spending will continue. However, both Democratic and Republican presidential candidates are talking about increasing federal spending on education and infrastructure, which if Congress agrees, will reduce the projected negative trend or even turn it into a positive trend.

Table 7
Forecast Growth Rates of Federal and State and Local Investment Spending

	2012	2013	2014	2015	2016	2017	2018	2019
Federal	-1.86	-5.82	-2.54	0.00				
State and Local	-1.87	-0.81	0.23	2.92				
Total Government	-1.86	-2.86	-0.86	1.79				
GS Federal					0.56	0.35	0.87	1.14
GS State and Local					1.18	1.40	2.22	2.33
GS Total					0.94	1.00	1.70	1.88
B of A Total					0.92	0.54		
Slow Growth					0.94	0.94	1.10	1.03
Full Employment					0.98	1.13	1.31	1.31

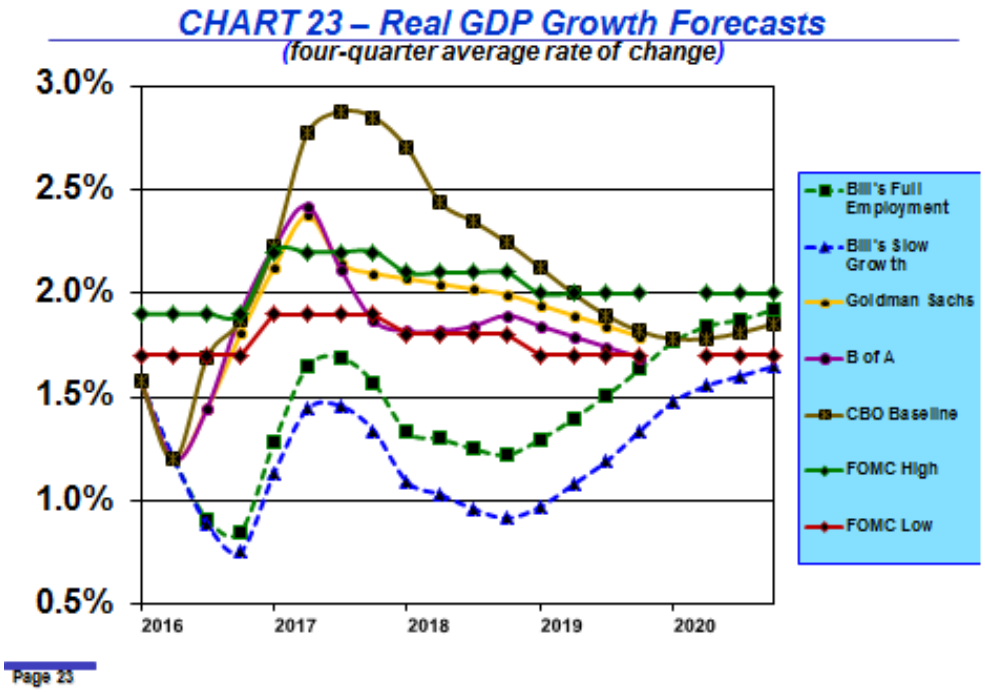
6. Second Quarter 2016 Forecast Update and Third Quarter Expectation

B of A has raised its forecast for the second quarter "**Final Estimate**" of GDP growth from 1.1 to 1.5 percent. The consensus median is 1.4 percent.

B of A is tracking 2.8 percent third growth. **GS** currently is projecting 3.0 percent. Both forecasters expect third quarter real GDP growth to be boosted by a recovery in inventory accumulation.

7. Longer-Term Real GDP Forecasts

Chart 23 and **Table 2** show quarterly real GDP growth projections from 2016 to 2020. With the exception of **CBO's** forecast and my forecasts, other forecasts for the next four years are tightly clustered. But, all exhibit a slight deteriorating trend as time passes.



As I explained in **Section III**, my "**Slow Growth**" scenario is on the pessimistic end of the spectrum because it is based upon **CBO's** collapse in employment growth in 2018 and 2019. **CBO's** forecasts for 2017 and 2018 are at the optimistic end of the range, which is entirely inconsistent with its assumption about slow employment growth during that period of time. All other forecasts fall within the **FOMC's** high and low estimates throughout the 2017-2019 periods. Besides the low employment growth embedded in my "**Slow Growth**" scenario, real GDP growth in that scenario and also in my "**Full Employment**" scenario is depressed by assumption of continued depressed productivity gains relative to the forecasts of other analysts. While my assumptions may prove to be overly pessimistic, I would suggest to you that the risks are skewed to the downside, and by that I mean that real GDP is more likely to come in under rather than over the forecasts of others in the next few years.

V. U.S. Employment Developments

August's payroll employment gains came in below expectations at 151,000, bringing this year's monthly average to a still above trend level of 182,000 However, as the economy nears full employment, it is inevitable that monthly payroll growth will converge to the underlying natural rate of growth in the labor force, which currently is in a range of 70,000 to 80,000 monthly.

Job growth has already begun to slow. Monthly employment growth has averaged 182,000 so far in 2016 compared to 229,000 in 2015 and 251,000 in 2014. Slowing employment growth is reasonable and not worrisome because, while a small amount of slack remains in the labor market, the market is clearly very close to full employment based on many traditional measures.

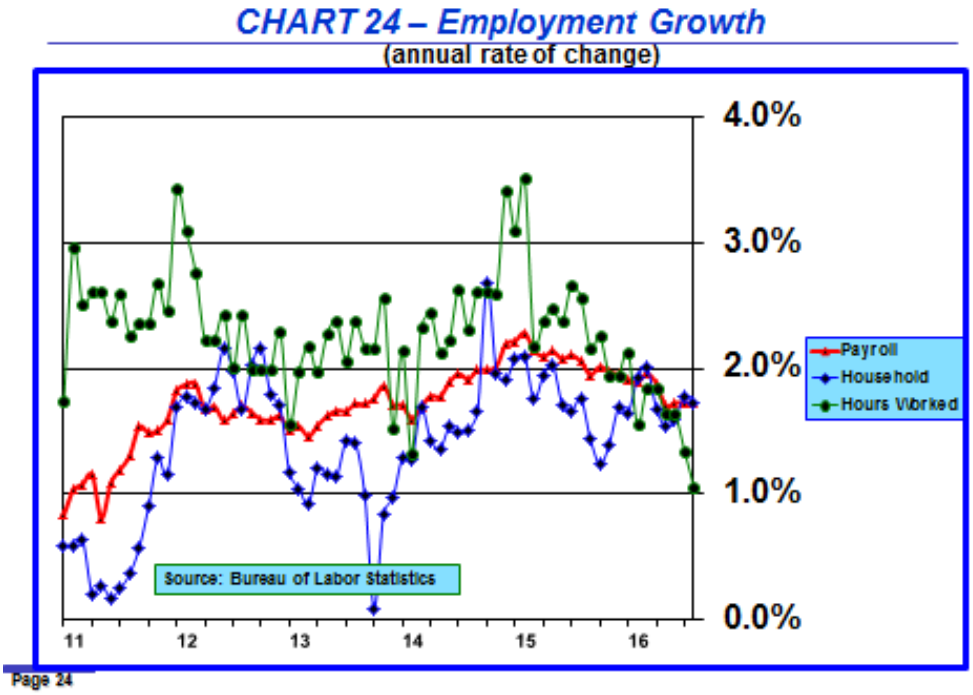
1. Employment Growth

The trend in the 12-month rate of growth in payroll employment is slowing gradually, down to 1.72 percent compared to 1.95 percent in 2015 and the peak rate of annual growth of 2.14 percent in March 2015.

Household employment rose 97,000 in August and has averaged 134,000 monthly over the first eight months of 2016 (note the discrepancy with the 182,000 monthly average from the payroll report). Monthly estimates of household employment growth are very volatile so a better sense of trend can be gained by looking at average monthly changes in household employment over longer time periods. Over the past 12 months, monthly household employment growth has averaged 214,000 compared to 204,000 for payroll employment. Both household and payroll employment have grown 1.72 percent over the past 12 months.

But, growth in total hours worked by all employees has been slowing more rapidly than growth in numbers of employees as the average length of the work week has shortened. The 12-month growth rate in total hours worked by all employees in August was 1.05 percent compared to 2.56 percent a year ago.

Chart 24 shows the three measures of employment growth — payroll employment, household employment, and total hours worked. Probably the most important thing to notice in **Chart 24** is the downward trend in growth of all three measures and particularly the rapid deceleration in the growth rates of total hours worked. This is indicative of a maturing labor market that is at or near full employment.

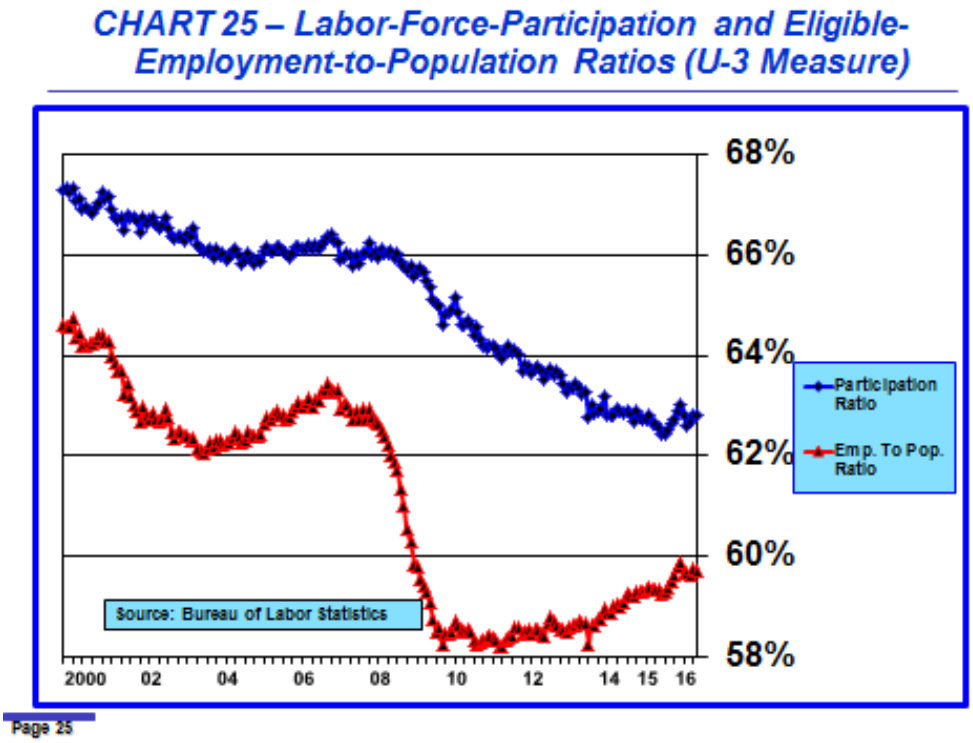


Generally, in the early stages of recovery employers increase the length of the work week of existing workers before hiring new ones resulting in total hours worked growing faster than the other two labor growth measures. This pattern reverses when economic activity weakens — employers cut hours before firing workers. Because monthly employment data are subject to large sampling error, the recent substantial deceleration in total hours worked is only suggestive of the advent of a weakening employment market.

Data over the remainder of the year will help establish whether this apparent developing trend is an artifact of data estimation methodology or is signaling the advent of weaker economic activity.

2. Employment Participation

Chart 25 shows the labor force participation rate and the eligible-employment-to-population ratio. The denominators of both measures are the total number of people eligible to work (the employment population). The numerator of the eligible-employment-to-population ratio is the total number of people employed and unemployed who wish to be in the labor force. The numerator of the participation ratio only counts those who are employed.



The eligible-employment-to-population ratio plunged during the Great Recession and then stabilized for several years before beginning to rise in 2014. However, the participation rate continued a steady decline until about a year ago. The downward trend in the participation ratio in recent years has been driven by changing demographics which should continue to reduce participation by about 0.2 percent annually over the next ten years. However, the decline in the participation ratio during and immediately following the Great Recession was exacerbated by the exit of discouraged workers from the labor force. Because discouraged workers are not counted in the labor force there has been considerable debate about their numbers and whether they would reenter the labor force once the labor market tightened. The increase in the participation rate from 62.42 percent in September 2015 to 62.82 percent in August is suggestive evidence that some discouraged workers have reentered the labor market in the last few months.

B of A examined the cyclical swings in the participation rate for prime working aged individuals (24-55). In past cycles participation for this cohort rose as the labor market tightened and wage growth began

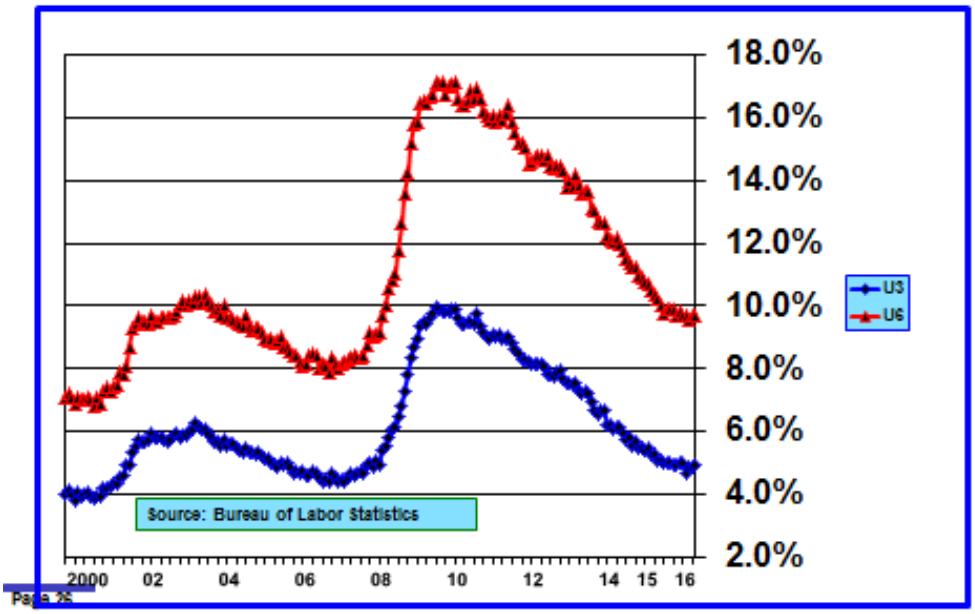
to accelerate. This phenomenon probably has helped stabilize the participation rate in recent months but its impact might be more limited going forward than in previous cycles based on other analysis.

The Council of Economic Advisors in a recent report concluded that part of the secular decline in labor force participation is due to declining demand for prime working age men. **GS** studied the decline in participation of prime-age men in the labor force and concluded, as did the Council of Economic Advisors, that demand factors have driven the decrease. **GS** cited three demand factors. First, many who have left the labor force cite retirement, disability, or simply a disinterest in working. Second, nonparticipants generally have lower education or younger men who have chosen to pursue their educations. Third, with changes in the kinds of jobs available some nonparticipants can't find work that matches their skills. These three reasons for decline in participation involve changes in the structure of the labor market, which implies that participation is unlikely to improve much, if at all, as the labor market tightens. However, that might change in part if skills retraining occurs for prime-age men who are willing to work but can't find jobs that match their skills.

3. Measures of Unemployment Reflect a Labor Market With a Modest Amount of Slack

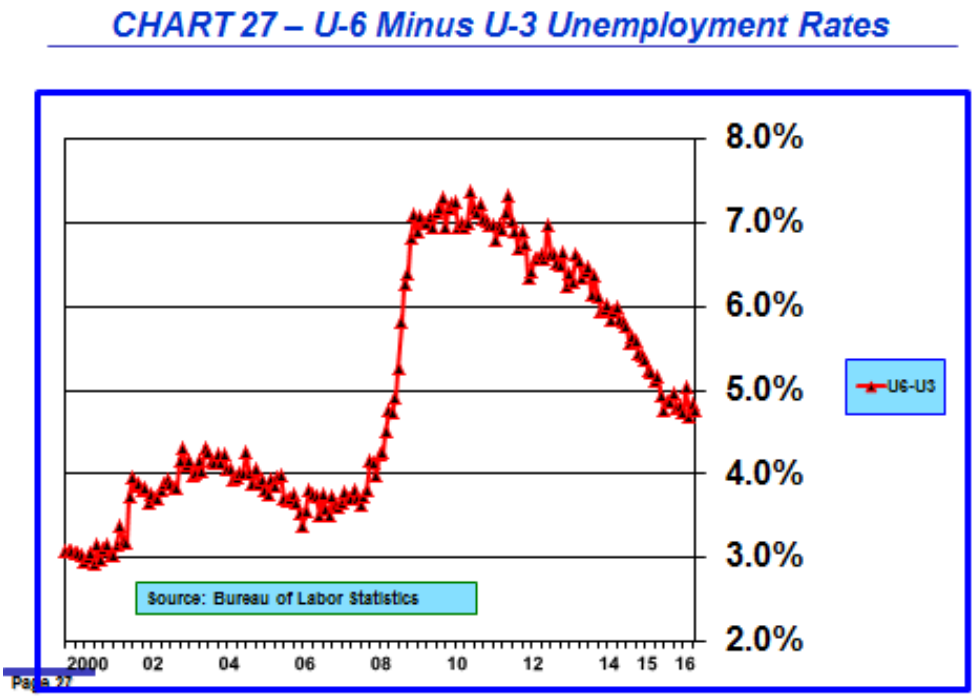
As can be seen in **Chart 26**, the U-3 unemployment rate has fallen to 4.92 percent and nearly matches the level attained prior to the Great Recession. The August U-3 unemployment rate was slightly above **CBO's** recently revised full employment (NAIRU) estimate of 4.74 percent.

CHART 26 – U-3 and U-6 Unemployment Rates



The U-6 measure of unemployment, which adds those working part time who would prefer full-time employment and those marginally attached to the labor force to the U-3 measure, has fallen to 9.69 percent but as can be seen in **Chart 27** is 0.7 percentage points above the pre-Great Recession 2005 difference

between the U-3 and U-6 unemployment measures when the labor market was at full employment. The U-6 measure of unemployment has fallen 0.58 percent over the last 12 months compared to a 0.19 percent decline in the U-3 measure, which underscores an improving labor market. Both unemployment measures reflect a tightening labor market with a modest amount of remaining slack.



Long-term and short-term unemployment rates are also indicators of labor market tightness and are shown in **Chart 28**. The short-term unemployment has returned to the low level that prevailed prior to the Great Recession. The long-term unemployment rate has declined from over 4 percent in the aftermath of the Great Recession to 1.26 percent in August. It is still about 0.4 percent above the low level reached in 2006 just prior to the onset of the Great Recession.

4. Forecasts of the U-3 Unemployment Rate

Forecasters expect the labor market to continue to tighten. The U-3 unemployment rate is only slightly above **CBO's** full-employment estimate of the non-accelerating inflation rate of unemployment (NAIRU). While this is certainly welcome news after seven years of high unemployment, further declines in unemployment will result in a tight labor market. Scarcity of workers will drive wages higher. This is also a favorable development because it will increase worker spending power. But, as the term NAIRU implies, when unemployment falls below this level for any length of time not only do wages increase but inflation increases as well. For that reason, the FOMC will worry about tweaking monetary policy to maintain full employment but limit the potential for tight labor markets to foster inflation. The traditional monetary policy tool involves raising interest rates. While this worry is a prominent topic for FOMC members, offsetting worries about tepid growth in real GDP and fragility of international financial markets have resulted in the FOMC adopting a cautious, go slow approach to increasing interest rates.

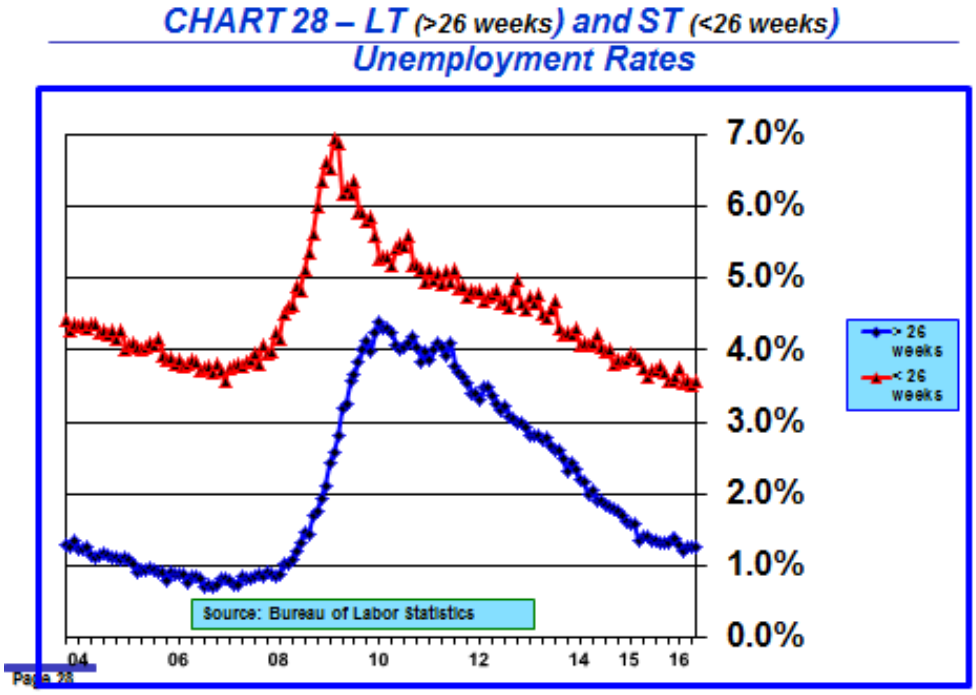


Chart 29 and **Table 8** show U-3 unemployment rate forecasts for **B of A**, **GS**, **and FOMC** high and low range, and my "**Slow Growth**" and "**Full Employment**" scenarios. **CBO's** estimate of NAIRU is also shown in **Chart 29**. (**CBO** lowered its estimate of the NAIRU unemployment rate 10 basis points in its August 2016 revisions of economic assumptions.)

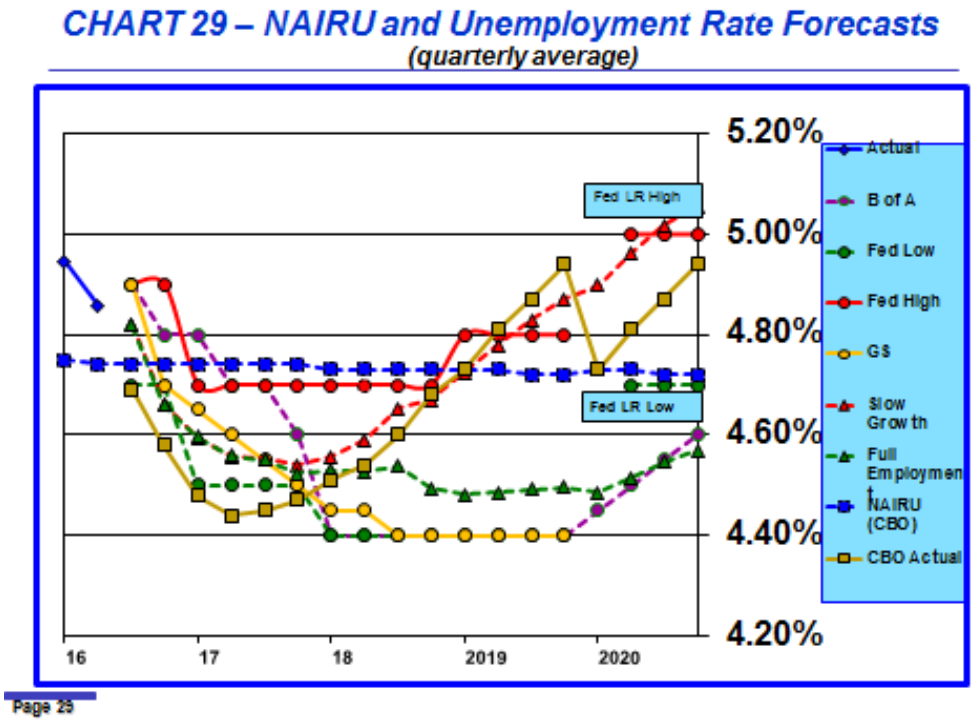


Table 8
Quarterly Unemployment Rate Forecasts

	NAIRU	CBO Forecast	Fed High	Fed Low	B of A	Goldman Sachs	Slow Growth	Full Employment
2016 Q3	4.74%	4.69%	4.90%	4.70%	4.90%	4.90%	4.82%	4.82%
2016 Q4	4.74%	4.58%	4.90%	4.70%	4.80%	4.70%	4.66%	4.66%
2017 Q1	4.74%	4.48%	4.70%	4.50%	4.80%	4.65%	4.59%	4.60%
2017 Q2	4.74%	4.44%	4.70%	4.50%	4.70%	4.60%	4.56%	4.56%
2017 Q3	4.74%	4.45%	4.70%	4.50%	4.70%	4.55%	4.55%	4.55%
2017 Q4	4.74%	4.47%	4.70%	4.50%	4.60%	4.50%	4.54%	4.52%
2018 Q1	4.73%	4.51%	4.70%	4.40%	4.40%	4.45%	4.56%	4.53%
2018 Q2	4.73%	4.54%	4.70%	4.40%	4.40%	4.45%	4.59%	4.53%
2018 Q3	4.73%	4.60%	4.70%	4.40%	4.40%	4.40%	4.65%	4.54%
2018 Q4	4.73%	4.68%	4.70%	4.40%	4.40%	4.40%	4.67%	4.49%
2019 Q1	4.73%	4.73%	4.80%	4.40%	4.40%	4.40%	4.72%	4.48%
2019 Q2	4.73%	4.81%	4.80%	4.40%	4.40%	4.40%	4.78%	4.49%
2019 Q3	4.72%	4.87%	4.80%	4.40%	4.40%	4.40%	4.83%	4.49%
2019 Q4	4.72%	4.94%	4.80%	4.40%	4.40%	4.40%	4.87%	4.50%
2020 Q1	4.72%	4.97%	Long Term		4.45%		4.90%	4.48%
2020 Q2	4.71%	4.97%	5.00%	4.70%	4.50%		4.96%	4.51%
2020 Q3	4.71%	4.97%	5.00%	4.70%	4.55%		5.02%	4.55%
2020 Q4	4.71%	4.97%	5.00%	4.70%	4.60%		5.06%	4.57%

Most forecasts project that the unemployment rate will fall below NAIRU over the next three years. **GS** and **B of A** are the most optimistic and anticipate that the unemployment rate will fall to 4.4 percent by 2018. My **"Slow Growth"** scenario tracks 10 to 20 basis points above **CBO's** NAIRU estimate and the upper end of the **FOMC's** projection range.

Notice that **CBO's** estimate of the actual unemployment rate falls faster than **B of A** and **GS** forecasts over the next few quarters, but then reverses course in about a year's time and converges with my **"Slow Growth"** scenario estimate by late 2019.

Table 9 shows the FOMC's central tendency range for its unemployment rate projections prepared quarterly going back to December 2012. What clearly stands out is that the unemployment rate has improved more quickly and much more than FOMC members expected. Also, the long-run full-employment unemployment rate has declined significantly. These revised and more optimistic projections explain in part why the FOMC has been patient in raising interest rates. Increases in inflation only become a real threat when full employment is reached, which has occurred only recently based upon the U-3 unemployment rate. However, other labor market measures suggest that some slack still remains.

5. Wage Growth Is Finally Discernible and Appears To Be Gathering Momentum

As the labor market approaches full employment, theory and past experience indicate that growth in wages should be accelerating. That is what is supposed to happen when excess supply disappears and demand is increasing. But acceleration in wage growth to date, although now visible, has been weaker than experience suggests should be the case.

Table 9
Economic Projections of Unemployment Rate by Federal Reserve Board Members And Federal Reserve Bank Presidents, March 2016

Unemp.Rate %		Central Tendency						
		2014	2015	2016	2017	2018	2019	Longer Run
Actual		5.57%	5.01%					
2016	Sept			4.7 - 4.9	4.5 - 4.7	4.4 - 4.7	4.4 - 4.8	4.7 - 5.0
	June			4.6 - 4.8	4.5 - 4.7	4.4 - 4.8		4.7 - 5.0
	Mar			4.6 - 4.8	4.5 - 4.7	4.5 - 5.0		4.7 - 5.0
2015	Dec		5.0	4.6 - 4.8	4.6 - 4.8	4.6 - 5.0		4.8 - 5.0
	Sep		5.0 - 5.1	4.7 - 4.9	4.7 - 4.9	4.7 - 5.0		4.9 - 5.2
	June		5.2 - 5.3	4.9 - 5.1	4.9 - 5.1			5.0 - 5.2
	Mar		5.0 - 5.2	4.9 - 5.1	4.8 - 5.1			5.0 - 5.2
2014	Dec	5.8	5.2 - 5.3	5.0 - 5.2	4.9 - 5.3			5.2 - 5.5
	Sep	5.9 - 6.0	5.4 - 5.6	5.1 - 5.4	4.9 - 5.3			5.2 - 5.5
	June	6.0 - 6.1	5.4 - 5.7	5.1 - 5.5				5.2 - 5.5
	Mar	6.1 - 6.3	5.6 - 5.9	5.2 - 5.6				5.2 - 5.6
2013	Dec	6.3 - 6.6	5.8 - 6.1	5.3 - 5.8				5.2 - 5.8
	Sep	6.4 - 6.8	5.9 - 6.2	5.4 - 5.9				5.2 - 5.8
	June	6.5 - 6.8	5.8 - 6.2					5.2 - 6.0
	Mar	6.7 - 7.0	6.0 - 6.5					5.2 - 6.0
2012	Dec	6.8 - 7.3	6.0 - 6.6					5.2 - 6.0

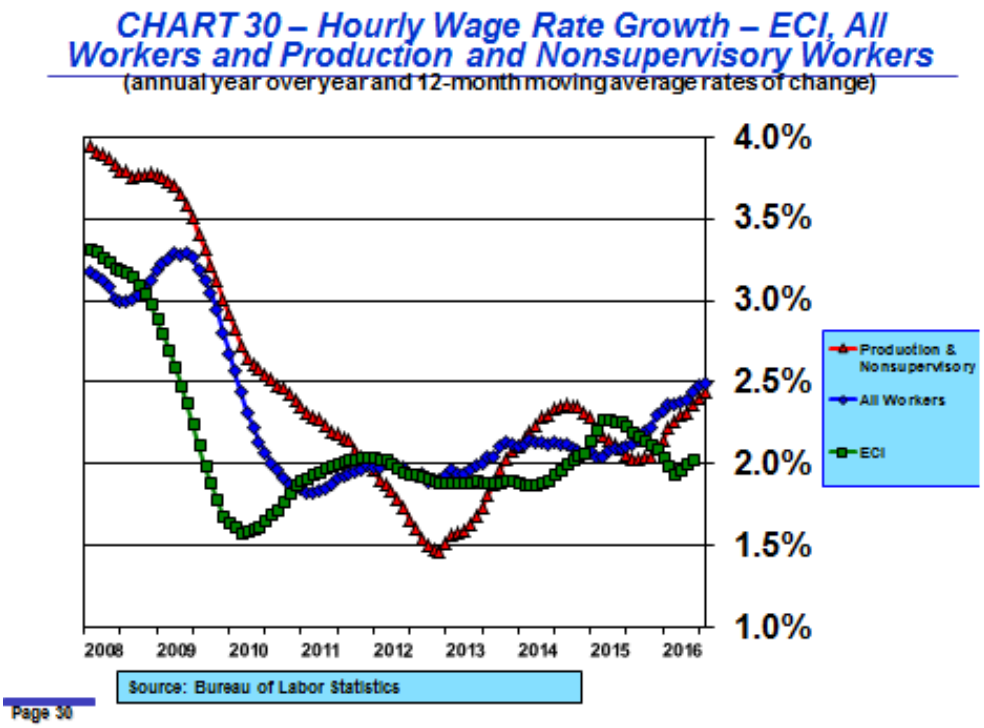
For quite some time FOMC members have been expecting the rate of growth in wages to pick up and boost inflation. Although slow to develop, evidence is finally emerging that wage growth is accelerating.

Growth in wages is an important measure of labor market strength. An increasing rate of growth is evidence of a strengthening labor market in which labor, particularly in scarcer job categories, is gaining more bargaining power.

a. BLS-Compiled Wage Measures — Employment Situation Report

There are three primary broad-based measures of labor compensation that provide information about compensation trends. All are compiled by the Bureau of Labor Statistics (BLS). One is released monthly as part of the monthly labor situation report and includes both hourly and weekly wage rates for all employees and separately for production and nonsupervisory workers, but includes no information about benefits which comprise approximately 30 percent of total compensation. A second measure, the employment cost index (ECI), is released quarterly and consists of wage and salary, benefits, and total compensation indices. A third is also released quarterly as part of BLS's report on output, total hours worked, and productivity. **Chart 30** shows the rate of growth in hourly wages for all workers, production and nonsupervisory workers, as well as the ECI (total compensation, including benefits).

All three sets of measures in **Chart 30** track each other closely over time. Since 2013 all three have moved in a tight band between 2.0 and 2.5 percent.

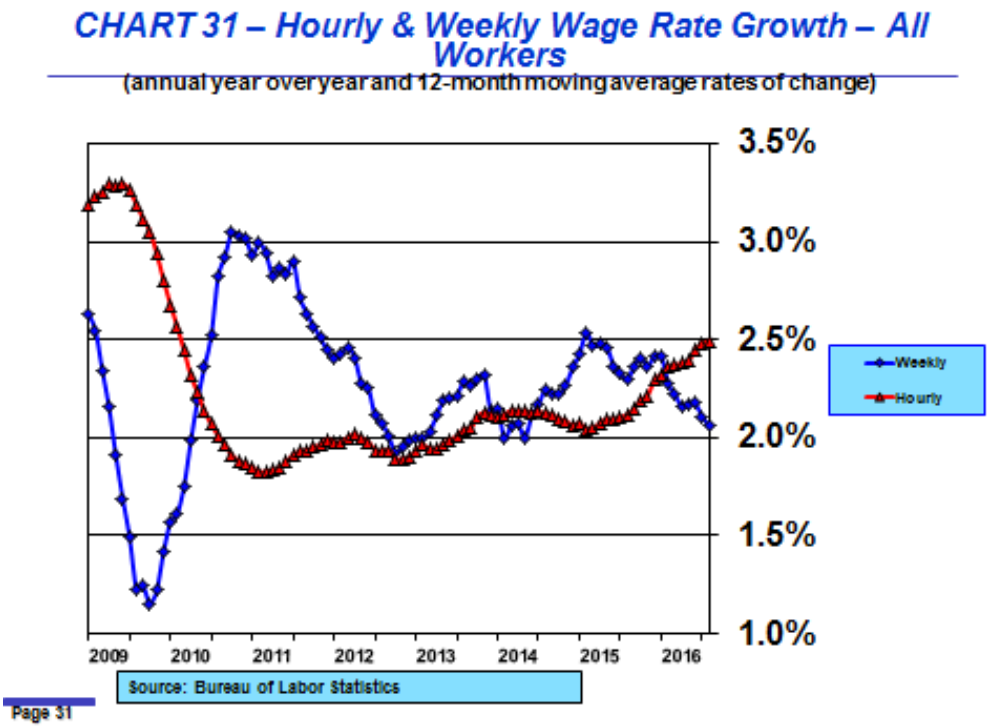


Although these measures are highly correlated over time, because compilation methodologies differ for each set of measures percentage changes over fixed time periods will not necessarily be in sync. This is the case currently. Average hourly wages (12-month moving average) of all employees are rising 2.49 percent annually currently compared to 2.12 percent a year ago and average. Average hourly wages (12-month moving average) of production and nonsupervisory workers are rising 2.44 percent annually compared to 2.04 percent a year ago. However, growth in ECI has edged down a bit over the last year to 2.03 percent in June. The same is true also for the wages and salaries component of ECI which was growing at a rate of 2.14 percent in June.

b. Weekly Versus Hourly Wage-Rate Growth

But perhaps focusing only on hourly wages is a bit misleading. If one looks at growth in average weekly earnings, which factors in the length of the workweek and thus incorporates changes in the mix of full and part-time employees, rather than the hourly wage rate, growth in weekly wages for all employees has fallen from 2.29 percent a year ago to 2.06 percent in August 2016 (see **Chart 31**). This outcome reflects a modestly shorter average number of hours worked per week, which could be due to a greater proportion of part-time workers as well as fewer hours for other employees. Disposable income depends upon growth in total weekly earnings rather than growth in the hourly wage rate. This means that deceleration in the growth rate in average weekly wages will translate into slower growth in disposable income and correspondingly slower growth in consumer spending.

During the second quarter, the effect of a slowing rate of increase in weekly wages was not evident in consumer spending data. However, weaker than expected growth in retail sales in both July and August may indicate that weakening growth in weekly wages is beginning to impact consumer spending.



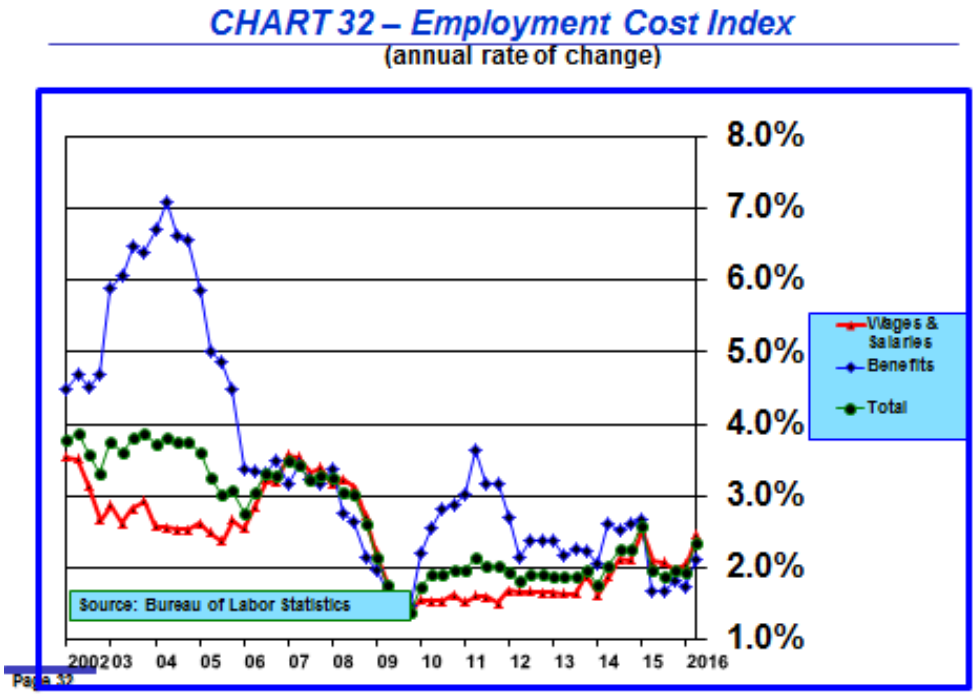
Although nominal consumer spending growth was weak in the first quarter of 2016, increasing just $62.3 billion (0.48 percent increase), spending rebounded strongly in the second quarter, rising $196.6 billion (1.52 percent increase). The second quarter rebound exceeded trend growth by approximately $76 billion (my statistical analysis indicates that this deviation amounted to a +1.19 standard deviation, a large but not overly significant deviation from trend). We will have to wait for data revisions and consumer spending data in months to come to see whether a slowing in total hours worked will depress consumer spending growth. Weak retail sales in July and August suggest that some of the second quarter's overshoot in consumption spending will reverse in the third quarter.

c. BLS-Compiled Wage Measures — Employment Cost Index (ECI)

The growth rate in the wage and salary component of ECI, which had been lagging other measures of wage acceleration, caught up in the second quarter of 2016, rising 2.45 percent (see **Chart 32**).

The more comprehensive measure of ECI, which includes benefits, rose at a slightly slower rate of 2.34 percent, reflecting a subdued rate of increase in benefits in recent years.

All-in-all the information contained in the ECI measure corroborates the story of accelerating wage growth, but suggests that acceleration is relatively modest.



d. Private Sector Wage Tracking Measures

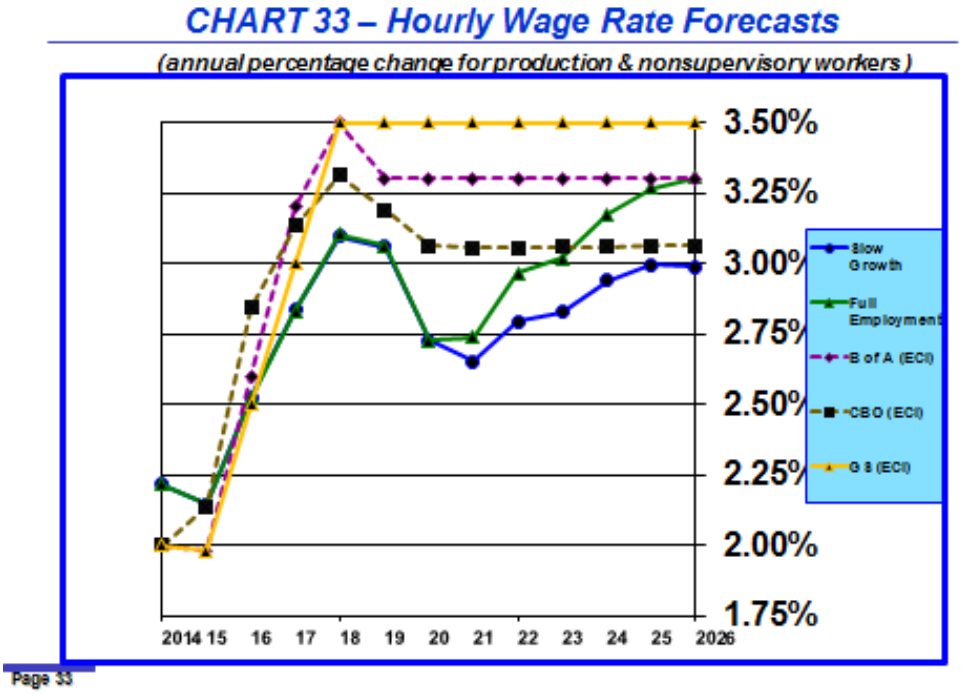
Other measures of wages indicate some upward pressure is developing. For example, **GS's** wage tracker, which is based on four measures of wage rate growth and is intentionally constructed to forecast changes in wage rate growth, has risen to 2.5 percent. **GS** expects wage rates to rise over the next two years to a range of 3.0 percent to 3.5 percent and then stabilize at that level.

Another frequently cited wage tracker is published by the **Atlanta Federal Reserve Bank**. It measures wage increases for workers who have been employed a year or longer. This wage tracker indicated a 3.3 percent annual increase in wages for such workers as of August, down from 3.6 percent in June. It overstates the rate of aggregate wage rate increase because it is a selective measure that leaves out a large share of people who have been in a job for less than a year. Typically, replacement employees start out at lower wage rates than the previous incumbent earned. But, the **Atlanta Federal Reserve Bank** tracker does give a reasonable sense of wage growth momentum in a tight labor market.

e. Hourly Wage Forecasts

Chart 33 shows my projections for wage growth for production and nonsupervisory workers over the next ten years and **CBO's**, **GS's**, and **B of A's** projections for growth in the wage and salary component of ECI for all workers over the same time period. A couple of explanations of details shown in **Chart 16** are in order.

First, the data series for all employees only began in 2006 while the data series for production and nonsupervisory workers goes back to 1964. Thus, the data series for production and nonsupervisory



workers contains a lot more historical information which is useful for constructing robust forecasts. In the long run growth rates in wages for all employees and for production and nonsupervisory workers are highly correlated (see **Chart 30**).

Second, **CBO**, **GS**, and **B of A** forecast wage rate growth only for ECI. Although the methodologies for constructing these different wage data series differ, the directionality of all is highly correlated over time, even if the levels aren't precisely the same. With the except of **GS's** forecast, wage growth in all other forecasts, including mine, declines about 25 basis points between 2018 and 2020. Mine then edge up after 2021, while the others remained unchanged.

Looking at **Chart 33**, the major takeaway is that my forecasts increase slightly more slowly over the next two years to approximately 3.0 percent while other forecasts rise to 3.25 to 3.50 percent over the same time period.

f. Two-Tiered Labor Market

Wages have been growing at an annual rate of 3.4 percent for the lowest fifth of hourly wage employment sectors. Wage growth in the remaining four-fifths of higher wage employment sectors has edged up only a little to an annual rate of 2.4 percent. The bottom 20 percent includes gasoline stations, food services, social assistance, food and beverage stores, sporting goods stores, and clothing stores. Many of the jobs in these employment sectors have benefited from increases in minimum wage laws, which **B of A** estimates accounts for approximately half of the higher rate of wage growth in these sectors.

Because low wage jobs generally require a low level of skills, fast wage rate growth for these jobs is

unlikely to have much impact on wage rate growth for higher skilled jobs. The supply of available low-skilled workers has declined faster in recent months than it has for higher-skilled workers, thus contributing to upward pressure on wages. This squeeze on the supply of low-skilled workers may stem in part from limited immigration. Migration dropped sharply following the Great Recession and resulted in a 0.2 percent decrease in the annual rate of U.S. population growth. As the labor market has improved, migration has not picked up. According to **GS**, this equivalent to the loss of about 20,000 potential employees monthly, most of whom would be employed in the low-wage sectors.

6. Labor Market Conditions

Labor market conditions, according to the Federal Reserve's index, weakened to 0.7 in August from 1.3 in July.

7. Concluding Observations

U.S. employment is nearing full employment. The U-3 unemployment rate of 4.9 percent is about 0.2 percent above **CBO's** estimate of full employment and the U-6 rate is about 0.6 percent away from full employment. However, according to a **GS** study, the Affordable Care Act might have raised the U-6 rate by 0.8 percent.[14] In the same study, **GS** found that when the labor market reaches full employment, employment growth slows, but not dramatically. In other words, cyclical momentum will continue to drive the unemployment rate down to a level below that of full employment.

But, can the labor market remain as strong as it has been in recent months when the pool of skilled eligible workers is shrinking? And, what if erosion of profit margins as wages rise puts pressure on employers to curtail hiring? Is the recent shortening in the length of the workweek a warning signal? And, what if consumer spending continues to slow? Won't that lead to unwanted inventories and production cutbacks? And, will political uncertainty spawned by the presidential election campaign prompt employers to become more cautious? What if stock prices decline sharply and financial conditions tighten, perhaps because of an international shock or tighter U.S. monetary policy? That outcome would likely feed employer caution.

There are many risks. The labor market may well continue its forward march, but the balance of risks appears to me to weigh in the direction of slower employment growth in coming months. Also, longer run, the demographics simply do not support the rate of growth in employment that we have experienced in recent times. We may look back at the summer of 2016 and conclude that it marked the apex of good times in the employment market.

VI. U.S. Monetary Policy Developments — September FOMC Meeting

Three FOMC members, the so-called hawks, voted to raise the federal funds rate at the September meeting. However, a majority voted to stay the course. This split vote highlighted the growing impatience of a

[14] David Mericle. "US Daily: The Payrolls Slowdown: Supply or Demand?" Goldman Sachs Economic Research, June 9, 2016.

significant minority of members to raise interest rates as the labor market approaches full employment and inflation slowly grinds higher toward the FOMC's 2.0 percent target. The market expected a "hawkish hold" and that is what the FOMC delivered — no change in rates but strong hints that a rate increase is in the offing, probably in December. Nonetheless, Fed Board Chair Janet Yellen's comments during the post-meeting press conference were cautious and balanced and did not signal the inevitability of a December rate increase. That will depend upon domestic and global economic developments over the next couple of months. Markets heaved a sigh of relief — U.S. stock prices rebounded to close to their highs for the year, bond rates edged down, and federal funds futures signaled only a 60 percent probably of a rate increase in December.

1. FOMC Monetary Policy Statement

In the **first paragraph** of its statement, the FOMC summarizes recent economic developments with particular emphasis on employment and inflation.

The **second paragraph** begins with a statement of monetary policy objectives and then articulates the Committee's expectations about evolving economic developments. In the past, the second paragraph included an assessment of the balance of risks, which was interpreted by market participants to signal whether the FOMC had a neutral, tightening, or loosening bias. More recently, the FOMC has emphasized that monetary policy is data dependent and dropped the balance of risks assessment from the second paragraph. In the September statement the FOMC reintroduced balance of risks language: "*Near-term risks to the economic outlook appear* ***roughly*** *balanced."* "Roughly" is a qualifying adjective that the FOMC has not used in the past. Those who like to parse words suggested this is stronger language than "nearly" but the inclusion of a qualifier does not absolutely signal, in the way the use of language without any qualifier would, that the FOMC will probably raise rates at the November or December meetings. The futures market's 60 percent probability is consistent with this interpretation.

Specific monetary policy decisions reached at the meeting are summarized in the **third paragraph**.

The **fourth paragraph** is instructional. It describes what the FOMC considers in formulating monetary policy. It also states explicitly that adjustments in policy will be gradual and will depend on "... *the economic outlook as informed by incoming data*."

In the **final paragraph**, the FOMC states its balance sheet management strategy. This paragraph was added to the statement when the FOMC first began to engage in large scale asset purchases, otherwise known as quantitative easing. The wording of this paragraph has not changed for many months.

2. Economic Activity

In the September statement, the FOMC upgraded its assessment of overall economic activity, noting that the "labor market has continued to strengthen ... job gains have been solid, on average," "growth of economic activity has picked up," "household spending has been growing strongly," but "fixed business investment has remained soft." The FOMC's statement about strong household spending seems out of date given the weak July and August retail sales data. Other timely economic data have been mixed and

seem somewhat at odds with the FOMC's assessment of economic activity.

Table 10 shows the FOMC's central tendency projections for real GDP growth for 2016, 2017, 2018, 2019, as well as the long-term potential real rate of GDP growth. GDP growth projections for both 2016 and 2017 were reduced and the upper bound of the range for long-term growth came down. What stands out in **Table 10** is the steady decline in projected growth over the last four years.

Table 10
Economic Projections of Real GDP By Federal Reserve Board Members And Federal Reserve Bank Presidents, September 2016

Real GDP %		Central Tendency						
		2014	2015	2016	2017	2018	2019	Long Run
Actual		2.47	1.98					
2016	Sep			1.7 - 1.9	1.9 - 2.2	1.8 - 2.1	1.7 - 2.0	1.7 - 2.0
	June			1.9 - 2.0	1.9 - 2.2	1.8 - 2.1		1.8 - 2.0
	Mar			2.1 - 2.3	2.0 - 2.3	1.8 - 2.1		1.8 - 2.1
2015	Dec		2.1	2.3 - 2.5	2.0 - 2.3	1.8 - 2.2		1.8 - 2.2
	Sep		2.0 - 2.3	2.2 - 2.6	2.0 - 2.4	1.8 - 2.2		1.8 - 2.2
	June		1.8 - 2.0	2.4 - 2.7	2.1 - 2.5			2.0 - 2.3
	Mar		2.3 - 2.7	2.3 - 2.7	2.0 - 2.4			2.0 - 2.3
2014	Dec	2.3 - 2.4	2.6 - 3.0	2.5 - 3.0	2.3 - 2.5			2.0 - 2.3
	Sep	2.0 - 2.2	2.6 - 3.0	2.6 - 2.9	2.3 - 2.5			2.0 - 2.3
	June	2.1 - 2.3	3.0 - 3.2	2.5 - 3.0				2.1 - 2.3
	Mar	2.8 - 3.0	3.0 - 3.2	2.5 - 3.0				2.2 — 2.3
2013	Dec	2.8 - 3.2	3.0 - 3.4	2.5 - 3.2				2.2 - 2.4
	Sep	2.9 - 3.1	3.0 - 3.5	2.5 - 3.3				2.2 - 2.5
	June	3.0 - 3.5	2.9 - 3.6					2.3 - 2.5
	Mar	2.9 - 3.4	2.9 - 3.7					2.3 - 2.5
2012	Dec	3.0 - 3.5	3.0 - 3.7					2.3 - 2.5

3. Employment

As discussed in **Section V**, little slack remains in the labor market and compensation has begun to rise, albeit slowly. If employment were the only policy goal, the FOMC's task to proceed in normalizing interest rates would be clear. In previous monetary policy tightening cycles, the FOMC has always moved more quickly to raise rates when the labor market tightened than it has so far in this cycle.

By pursuing a gradual tightening approach, the FOMC risks inflation overshooting the target of 2.0 percent. Of course, the target is intended to be an average over the cycle, not a ceiling. The fact is that inflation has been below the 2.0 percent target for an extended period of time. Nonetheless, some policymakers worry that if policy response is delayed too long the market consequence might be that inflation expectations become unanchored. This is an obvious concern of the three dissenting FOMC members.

FOMC projections of the U-3 unemployment rate are shown in **Table 9**. While the FOMC has

consistently overestimated expected real GDP growth, it has simultaneously underestimated the decline in the unemployment rate. While these forecasting misses would seem at first blush to be inconsistent, with the benefit of hindsight there have been two drivers. One is that productivity has not recovered to higher levels as expected which explains why real GDP growth has not measured up to expectations. The other is that labor force participation has been much weaker than expected, resulting in a faster decline in the unemployment rate. Neither of these developments was anticipated. Earlier projections of real GDP growth and the unemployment rate were based on past experience of cyclical recovery patterns which have not repeated as expected.

4. Inflation

There was no change in the FOMC's assessment of inflation.

In the September FOMC statement, the Committee acknowledged that inflation remains below its long-term target level, but repeated that this is due, at least in part, to "*... earlier declines in energy prices and in prices of non-energy imports.*" The Committee also repeated word for word that "market-based" measures of inflation expectations have declined, but "survey-based" measures "*are little changed.*"

5. Peter Hooper's Assessment of Chair Yellen's Post-FOMC Meeting Press[15]

Peter Hooper, Deutsche Bank's economist provided a succinct summary of Janet Yellen's press conference comments about considerations important to determining whether and when to raise the federal funds rate. My take is that raising the federal funds rate is a close call but that the very low neutral rate of interest, discussed in **Section VII** below, and the possibility of weaker than expected economic activity in coming months, including slower employment growth, could well lead to further delays in raising rates, perhaps well beyond December. Peter's summary is quoted in full below:

"The message Chair Yellen delivered at the press conference was balanced, with something for both the doves and the hawks. She explained that the decision not to raise rates even in the face of evidence that was probably sufficient to allow them to do so at this juncture was in part an opportunistic one, along the lines advocated recently by Governors Brainard and Tarullo. She noted that the Fed's mandate includes achieving "maximum" sustainable employment. The labor market has surprised this year in the sense that unemployment has leveled off even as employment has continued to grow at a robust pace. This is because labor force participation has bounced back more strongly than expected, which gives the Fed more scope to be cautious in raising rates — that is, more scope to achieve a higher maximum level employment without raising inflation pressures excessively. She also noted the impressive flattening of the Phillips curve that also plays into this effect. Also on the dovish side, she emphasized the relatively modest degree of accommodation that is built into monetary policy currently — i.e., the current real fed funds rate is not that far below current estimates of the real neutral rate. So the Fed does not have that much work to do to remove monetary accommodation at present. She did note that this is a moving target: the current neutral level of the funds rate is expected to rise over time, though as indicated by the revisions to the dots, that rise is now seen as less rapid than thought previously.

[15] Peter Hooper. "Fed Note: What We Got From the September FOMC Statement and Press Conference," Deutsche Bank blog post, September 21, 2016.

For the hawks, Yellen fully recognized both the long and variable lags with which monetary policy affects the economy, and the risks that are entailed in waiting too long to remove accommodation. She said she is not in favor of the "whites of eyes" approach to reaching the inflation objective. Instead, she, stressed the importance of being forward looking, and indicated that the current expansion could easily be ended if the Fed had to catch up after falling behind the curve on inflation. Finally, Yellen also expressed some concern about potential financial stability risks stemming from reach for yield behavior induced by the very low level of rates — she noted in particular elevated value relative to rent in CRE [commercial real estate]."

VII. Importance of the Neutral Rate of Interest In Guiding Monetary Policy

In recent months there has been considerable discussion among economists and members of the FOMC about the unobservable value of the neutral rate of interest, r^*. This discussion is important because whatever the value of r^* is, that value serves as a guide to the long-term equilibrium value of the federal funds rate. That is why FOMC members provide an estimate of the long-term equilibrium value of the federal funds rate in the quarterly updates of economic variable projections. This is the rate that monetary policymakers believe should prevail when the economy is operating at full capacity and inflation is anchored at the long-term target value of 2 percent.

1. The Monetary Policy Conundrum

Today's federal funds policy rate is 25 to 50 basis points. The median value of the FOMC's projection for the long-term equilibrium value is 3.0 percent. The employment market is very near to full employment, but measured inflation, which is approximately 1.6 percent based on the FOMC's preferred core PCE inflation measure, is below the long-term 2.0 percent target.

These facts ordinarily would imply that the FOMC should be moving forward to move the actual policy rate toward the long-term equilibrium level of 3.0 percent. Based upon historical experience, moving too slowly to close the gap, when the economy is near full employment, risks letting inflation become unanchored with the eventual consequence that inflation rises to a level well above the 2.0 percent target.

But, we do not live in a closed economy. Disinflationary, even deflationary, forces have engulfed much of the developed world's economies. Thus, it cannot be taken for granted that U.S. inflation will move to the target level of 2.0 percent over time. Indeed, market measures of inflation expectations in the U.S. have exhibited worrisome hints of becoming unanchored to the downside.

There is yet another piece to the policy puzzle. Although the median FOMC member view is that the long-term equilibrium value of the federal funds rate should be 3.0 percent, this view is based on assumptions that may not hold up. If the estimate of the neutral rate is too high, moving too quickly to that level could well throw the U.S. economy into recession. Given the weakness of the global economy currently, this would have seriously negative knock on effects. Or put somewhat differently, the risks of moving too quickly to the long-term equilibrium level of the federal funds rate are much greater than the risks of moving too slowly. The risks of moving too slowly would be a higher rate of inflation than

the long-term target of 2.0 percent. However, measured inflation tends to change slowly over time. If it becomes clear sometime in the future that inflation is at risk of becoming unanchored and global economic activity is robust, then there would be room for the FOMC to raise rates aggressively to anchor inflationary expectations.

Because of the asymmetry of risks when nominal interest rates are close to zero and global economic and financial conditions are fragile, the FOMC has adopted a cautious monetary policy of gradual increases in the federal funds rate. Timing of increases are now dependent on thorough examination of incoming economic activity and inflation data and close vigilance of global economic developments and risks and the fragility of financial conditions in financial markets.

2. Determinants of the Neutral Rate of Interest, r^*

There are two components to r^*, a real rate of return and an inflation premium, which when added to the real rate defines the nominal neutral interest rate. The debate has focused on the real rate of return because everyone presumes that the FOMC will ultimately be successful in achieving its 2.0 percent target rate of inflation, so the inflation premium is taken for granted as being known.

However, based on the FOMC's preferred measure of inflation, core PCE, inflation have averaged 1.60 percent over the last five years. PCE inflation over the last 12 months was almost exactly the same at 1.57 percent in July. So, for starters, the 2.0 percent inflation target should not be taken for granted in estimating the nominal value of r^*.

Determination of the real rate component of r^* is even more daunting. Theory says that the real rate component should depend upon the economy's potential rate of growth and whether the economy is operating below, at, or above its full non-inflationary potential. The output gap, however, can only be measured once there is an estimate of full, noninflationary potential economic activity. So the quest for enlightenment must start there.

3. Real Long-Term Potential Economic Growth Rate

As I have explained in past letters, potential real GDP growth depends upon growth in **total hours worked**, which is primarily a function of population growth, labor force participation and average weekly hours worked per employee, and on **productivity**.

Slowing growth in **total hours worked** and much lower **productivity gains** have combined to reduce the potential real rate of growth. If U.S. productivity remains at the 0.9 percent average of the last ten years and if labor growth slows to **CBO's** forecasts of approximately 0.6 percent, potential real GDP growth will be 1.4 percent, which is quite a bit lower than the FOMC's long-term expected range of 1.8 to 2.0 percent. Implicitly, the FOMC's range assumes that productivity will recover to between 1.4 and 1.6 percent. So, if you are inclined toward a pessimistic view about the likelihood of improving productivity, you should expect the FOMC and others to ratchet down their estimates of real potential growth over time.

4. Long-Term Natural (Neutral) Nominal Interest Rate and the Expected Level of Real Potential Growth

When the FOMC began publishing its projections for the various economic variables several years ago, it included estimates of both the long-term real rate of GDP growth and the equilibrium nominal federal funds rate. As time has passed, the FOMC has reduced the projected values of both of these measures. It should be clear from the discussion above that as labor force growth and productivity decrease, potential real GDP also decreases.

But theory also posits that the nominal value of the long-run rate of interest should decline with decreases in both the growth rate in total hours worked and productivity. Thus, decreases in the growth rate of total hours worked and productivity will result in declines in both potential real GDP growth and the long-term neutral nominal rate of interest. My econometric model provides estimates of the long-run stabilized neutral rate and substantiates theoretical expectations.

Each 10 basis points change in productivity results in approximately an 8 basis points change in both the federal funds and 10-year Treasury rates. However, a 10 basis points change in the labor force growth rate has a 12 basis points impact on the federal funds rate but a smaller 7 basis points impact on the 10-year Treasury rate.

Values of the long-term neutral federal funds rate and the long-term equilibrium 10-year Treasury rate are shown in **Table 11** for various assumed values of the growth rate in total hours worked and productivity, along with the long-term potential real GDP growth rate implied by these assumed values.

Table 11
Long-Term Potential Real Rate of GDP Growth for Various Assumed Values of Growth in Total Hours Worked and Productivity and Corresponding Nominal Long-Term Natural (Neutral) Interest Rates for Federal Funds and 10-Year Treasury Rates
(assumes nominal rate of inflation = 2.0% and economy is at full employment)

	Assumptions		
Potential Real GDP	1.40%	1.82%	1.99%
Productivity	.9%	1.4%	1.6%
Labor Force	.6%	.6%	.6%
	Neutral Rate		
Federal Funds	1.06%	1.55%	1.74%
10-Year Treasury	2.10%	2.58%	2.77%

	Assumptions		
Potential Real GDP	1.59%	2.01%	2.17%
Productivity	.9%	1.4%	1.6%
Labor Force	.8%	.8%	.8%
	Neutral Rate		
Federal Funds	1.30%	1.79%	1.99%
10-Year Treasury	2.25%	2.73%	2.92%

The top panel of **Table 11** holds growth in total hours worked constant at 0.6 percent annually and shows the impact on neutral federal funds and the equilibrium 10-year Treasury rates for assumed productivity values of 0.9, 1.4, and 1.6 percent. The only change in the bottom panel of **Table 11** is in the assumed annual growth rate in total hours worked, which is raised to 0.8 percent.

Collectively, FOMC members have steadily reduced the median estimate of the long-term nominal value of the federal funds rate from 4.25 percent to 3.00 percent. However, based upon my model, as shown in **Table 11**, my sense is that the FOMC's median projection for the federal funds rate is still higher than is consistent with its estimate of long-term real GDP growth of 1.8 to 2.0 percent. My model indicates that a long-term nominal federal funds rate of 1.50 to 1.75 percent is a more likely level for the long-term neutral federal funds rate and it could be as low as 1.0 percent, if productivity remains at the dismal level of 0.9 percent that it has averaged over the last ten years. This also means that the real neutral interest rate, assuming inflation is 2.00 percent, would be slightly negative.

5. Other Empirical Estimates of the r^*

Determining the value of the real rate component of r^* empirically is hardly straightforward. There are other methods besides my custom-crafted one. Many analyses exist, but there is little consensus, other than all agree that the real rate is very low in today's economic environment.

There are two mainstream models. One is referred to as the dynamic stochastic general equilibrium model (DSGE) developed by Federal Reserve staff. The other has been popularized by the work of a team of Federal Reserve economists including Kathyrn Holston, Thomas Laubach, and San Francisco Federal Reserve Bank President John Williams (HLW), which differs somewhat from a predecessor model known as the Laubach-Williams model.[16]

Both models estimate a current real neutral rate close to zero. But their historical estimates of past real neutral rates differ considerably. Real rates in the DSGE model are quite volatile over the cycle, while HLW estimates change little over time. The difference has to do with construction of the different models, but I would guess that the DSGE model is capturing changes in the short-term neutral rate while the HLW model is capturing changes in the long-term neutral rate.

The HLW model simultaneously estimates the neutral rate, the potential growth rate, and the output gap based on historical data for GDP, inflation, and the federal funds rate. DSGE models take a somewhat similar approach. The difference appears to lie, at least in part, to HLW's methodology of handling volatility in the historical data.

Both models forecast a rising real neutral rate of interest as the output gap closes and inflation approaches the 2.0 percent target. However, the HLW model approaches a range of 0.5 to 0.75 percent while the DSGE model's estimate is closer to 2.0 percent. In contrast, the implied real neutral rate in my alternative method is slightly negative.

I expect the discussion will continue. There will be more research that might narrow the range of estimates. And, of course, time, data, and experience will provide further insight.

[16] Kathryn Holston, Thomas Laubach, and John C. Williams. "***Measuring the Natural Rate of Interest: International Trends and Determinants***", Federal Reserve Bank of San Francisco Working Paper Series, Working Paper 26-11, June 2016.

6. Whither Monetary Policy?

My suggested takeaway from all of this commentary is twofold. First, the FOMC has now come to a consensus to raise the federal funds rate gradually and to error on the side of doing so too late rather than too soon. Second, the long-term projected equilibrium nominal federal funds rate of 3.0 percent is still too high and is likely to be reduced in coming FOMC meetings to a lower level. If inflation does not move convincingly toward a stable level of 2.0 percent, and if productivity does not rebound as expected (secular stagnation proves to be a limiting force[17]), the long-term equilibrium federal funds rate could end up not even reaching the 2.0 percent level.

Given these considerations and combine them with the fact of low global interest rates and strong global disinflationary forces, a reasonable outlook is that interest rates, both short-run and long-run, will remain very low for a very long time. The market has come around to this view and it is a view that I cannot fault. (See **Chart 36** below).

VIII. Inflation and Interest Rates

As is shown in **Table 12**, the FOMC remains confident that both core and total PCE inflation will return to the 2.0 percent target level by 2018. Note that the FOMC has had to extend the time frame for achievement of the 2.0 percent target, but has not wavered from its conviction that the target will eventually be achieved.

1. Core Inflation

Core PCE inflation was 1.57 percent in July and has risen 26 basis points from its recent low of 1.31 percent in July 2015. Total PCE inflation, which continues to be depressed by the plunge in oil prices and lower import prices, was 0.79 percent in July, up from the 0.23 percent rate of increase that prevailed at the end of 2015.

As can be seen in **Table 13** (**Chart 34** shows historical core PCE price index data and data from **Table 13** in graphical form), forecasts of the core PCE inflation index indicate that inflation will increase modestly during 2016. Over the longer run, **B of A** and **GS** expect core PCE inflation to rise gradually, reaching 2.0 percent sometime during 2018. **B of A** expects inflation to rise above the 2.0 percent target to 2.3 percent in 2019, reflecting its belief that the FOMC will intentionally let inflation exceed the 2.0 percent target to assure that real GDP growth is sustained. **B of A** also expects inflation will recede to the 2.0 percent target over the long run. FOMC projections reflect a gradual rise to its 2.0 percent target.

In looking at **Chart 34**, my "**Slow Growth**" and "**Full Employment**" forecasts for core PCE inflation also move toward 2.0 percent by 2018. But, as can be seen in **Chart 35**, which shows my "**Slow**

[17] In past letters I have described Charles Gave's view that administered low interest rates will depress capital spending, leading to a decline in productivity and the potential growth rate. A byproduct is an enormous increase in income and wealth inequality which contributes to political instability. Charles Gave. "A Fundamental Assault On Freedom," GavekalResearch, July 12, 2016.

Table 12
Economic Projections of Inflation By Federal Reserve Board Members And Federal Reserve Bank Presidents, September 2016

Variable		Central Tendency						
		2014	2015	2016	2017	2018	2019	Long Run
PCE Inf. %	Sep			1.2 - 1.4	1.7 - 1.9	1.8 - 2.0	1.9 - 2.0	2.0
	June			1.3 - 1.7	1.7 - 2.0	1.9 - 2.0		2.0
	Mar			1.0 - 1.6	1.7 - 2.0	1.9 - 2.0		2.0
2015	Dec		0.4	1.2 - 1.7	1.8 - 2.0	1.9 - 2.0		2.0
	Sep		0.3 - 0.5	1.5 - 1.8	1.8 - 2.0	2.0		2.0
	June		0.6 - 0.8	1.6 - 1.9	1.9 - 2.0			2.0
	Mar		0.6 - 0.8	1.7 - 1.9	1.9 - 2.0			2.0
2014	Dec	1.2 - 1.3	1.0 - 1.6	1.7 - 2.0	1.8 - 2.0			2.0
	Sep	1.5 - 1.7	1.6 - 1.9	1.7 - 2.0	1.9 - 2.0			2.0
	June	1.5 - 1.7	1.5 - 2.0	1.6 - 2.0				2.0
	Mar	1.5 - 1.6	1.5 - 2.0	1.7 - 2.0				2.0
2013	Dec	1.4 - 1.6	1.5 - 2.0	1.7 - 2.0				2.0
	Sep	1.3 - 1.8	1.6 - 2.0	1.7 - 2.0				2.0
	June	1.4 - 2.0	1.6 - 2.0					2.0
	Mar	1.5 - 2.0	1.7 - 2.0					2.0
2012	Dec	1.5 - 2.0	1.7 - 2.0					2.0
Core PCE Inf. %	Sep			1.6 - 1.8	1.7 - 1.9	1.9 - 2.0	2.0	2.0
	June			1.6 - 1.8	1.7 - 2.0	1.9 - 2.0		2.0
	Mar			1.4 - 1.7	1.7 - 2.0	1.9 - 2.0		2.0
2015	Dec		1.3	1.4 - 1.7	1.7 - 2.0	1.9 - 2.0		2.0
	Sep		1.3 - 1.4	1.5 - 1.8	1.8 - 2.0	1.9 - 2.0		2.0
	June		1.3 - 1.4	1.6 - 1.9	1.9 - 2.0			
	Mar		1.3 - 1.4	1.5 - 1.9	1.8 - 2.0			
2014	Dec	1.5 -1.6	1.5 - 1.8	1.7 - 2.0	1.8 - 2.0			
	Sep	1.5 -1.6	1.6 - 1.9	1.8 - 2.0	1.9 - 2.0			
	June	1.5 -1.6	1.6 - 2.0	1.7 - 2.0				
	Mar	1.4 - 1.6	1.7 - 2.0	1.8 - 2.0				
2013	Dec	1.4 - 1.6	1.6 - 2.0	1.8 - 2.0				
	Sep	1.5 - 1.7	1.7 - 2.0	1.9 - 2.0				
	June	1.5 - 1.8	1.7 - 2.0					
	Mar	1.6 - 2.0	1.8 - 2.1					
2012	Dec	1.6 - 2.0	1.8 - 2.0					

Growth" and "**Full Employment**" forecasts through 2026, core PCE inflation does not remain at 2.0 percent as others expect but drifts down to a range of 1.50 to 1.75 percent. The principal culprit is weak productivity and also a modest rise in the employment gap as unemployment edges up in the "**Slow Growth**" scenario.

Table 14 shows contributions, based on my econometric model, of various economic variables to

CHART 34 – Core PCE Inflation
(annual percentage rate)

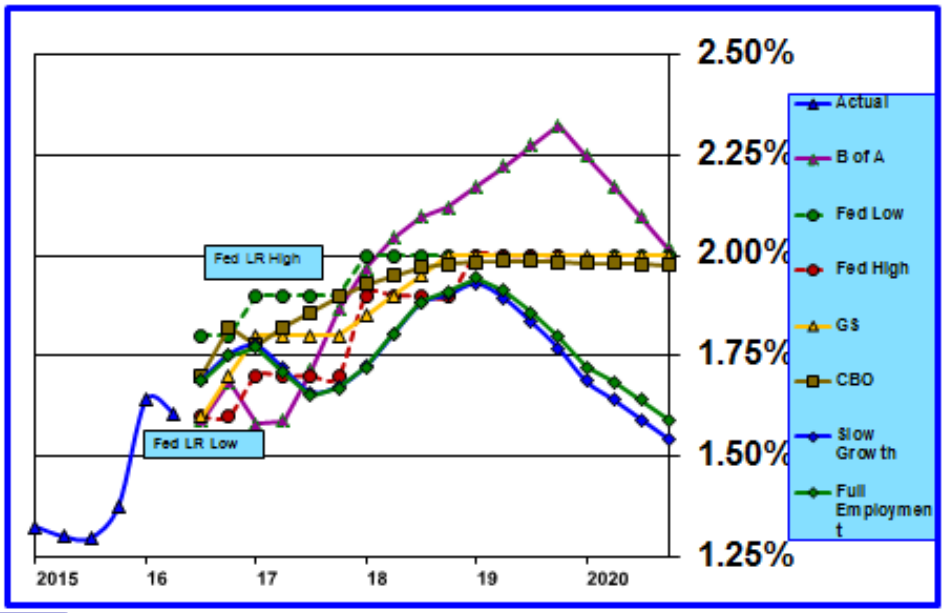


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CHART 35 – Core PCE Inflation
(annual percentage rate)

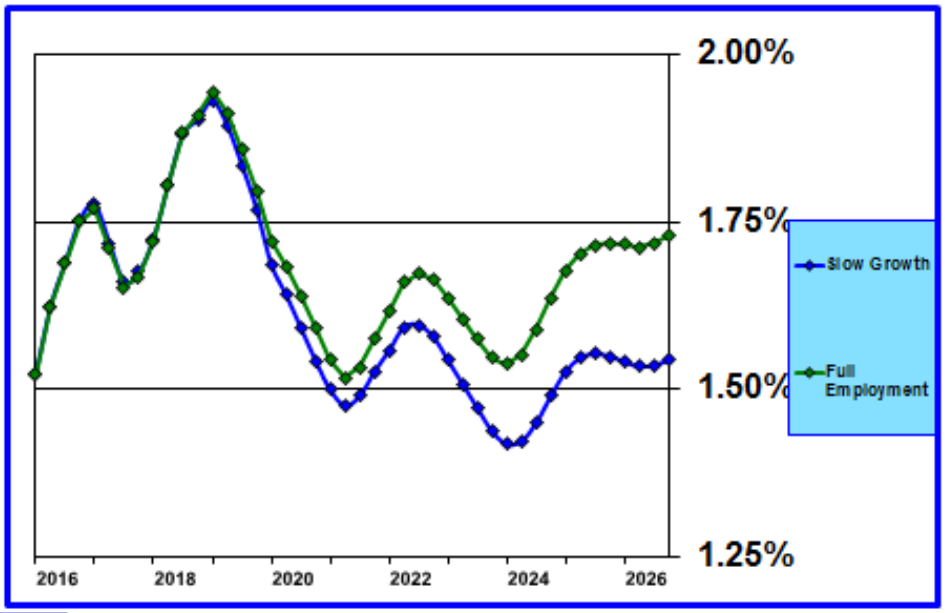

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Table 13
Core PCE Inflation Forecasts — B of A, GS, Bill's "Steady Growth", Bill's "Strong Growth" and FOMC High and Low

Core CPE	2013	2014	2015	2016	2017	2018	2019
Actual	1.55	1.50	1.39				
B of A				1.7	1.9	2.1	2.3
GS				1.7	1.8	2.0	2.0
Bill's Slow Growth				1.7	1.7	1.9	1.7
Bill's Full Employment				1.7	1.7	1.9	1.8
FOMC — High				1.8	2.0	2.0	
FOMC — Low				1.6	1.7	1.9	

forecast core PCE inflation for two periods of time — 2016-2020 and 2021-2026. The starting point is the 1.57 percent rate that prevailed in July. By the end of 2020 core PCE inflation is about the same in both the "**Full Employment**" and "**Slow Growth**" scenarios, as the positive impacts of tighter labor markets and the passthrough effects of gains in housing prices (proxy for the rent and owners equivalent rent components of the core PCE inflation index) are more than offset by negative impulses from low productivity (depresses the equilibrium real rate of inflation as well as the measured level of inflation) and the lagged effect of a stronger dollar (negative impact on U.S. manufacturing and lower import prices).

Table 14
Changes in Core PCE Inflation

(Basis Points)

	Labor Growth	Labor Gap	Productivity	Dollar	Housing Prices	Total
"Full Employment" Scenario						
2016-2020	-7	30	-36	-14	19	-7
2021-2026	1	-11	-24	59	-10	16
2016-2026	-6	19	-59	46	10	9
"Slow Growth" Scenario						
2016-2020	-8	22	-26	-11	11	-12
2021-2026	2	-31	-18	62	-13	2
2016-2026	-6	-8	-44	51	-2	-10

During the 2021 to 2026 period core inlation continues to move mostly sideways in both scenarios with the negative consequences of a falling dollar being largely offset by other factors.

2. Inflation Expectations

There have been two major global financial shocks so far in 2016. The first occurred in January and February as financial panic gripped global financial markets when oil prices plunged and concerns about China and emerging markets blossomed. The second occurred in late June in the immediate aftermath of Britain's vote to "Leave" the European Union.

In response to both shocks, interest rates declined. The 10-year U.S. Treasury note yield fell from 2.27 percent on December 31, 2015 to 1.71 percent on September 16, 2016 (low for the year so far was 1.37 percent on both July 5 and 8. in contrast, U.S. stock prices after many months of sideways movement broke out to all-time highs (S and P 500 index was 2190.15 on August 15, 2016, compared to the 2015 high of 2130.82 reached on May 21, 2015). In recent days, worries about the potential for less stimulative global monetary policies and weaker economic data reports have pushed the S & P 500 average down to 2139.16 as of September 16, 2016, basically continuing the sideways trading pattern that has prevailed over the last year and a half.

After both of these global shocks, the market decided that interest rates would remain lower for longer. This was validated by the decline in inflation expectations embedded in market interest rates. The market now places less than a 50 percent probability of one 25 basis points increase in the federal funds rate during 2016. This probability does not exceed 50 percent until the spring of 2017.

There are several possible explanations for extremely low long-term interest rates, which I discussed above. One I did not discuss involves a decline in long-term inflation expectations.

Forecasts of future inflation embedded in Treasury Inflation Protected Securities (TIPS) have declined during 2016 and these securities now embed a negative inflation risk premium. TIPS are forecasting inflation averaging less than 1.5 percent over the next five years, which is at odds with the FOMC stated policy objective.

Survey-based measures of inflation expectations, such as the University of Michigan's 5-10 year expected inflation rate, have weakened a little but not to the same extent as market-based measures. This survey measure of long-term inflation expectations fell from an average of 2.9 percent over the past several years to 2.6 percent in June and July. The Survey of Professional Forecasts has also edged down a tiny amount.

Perhaps other factors have depressed the market measure of inflation expectations, which would mean that it is not necessarily a reliable indicator of future inflation. **GS** has cited two reasons that this may well be the case. First, limited liquidity and heightened demand for TIPS, which have nothing to do with inflation expectations, may have depressed yields on the benchmark security relied on to tease out a measure of market-based inflation expectations. Second, the price of the benchmark security has tended to fluctuate in lockstep with the price of oil, which has been very volatile. The price of oil may be a poor indicator of general trends in inflation because fluctuations in its price are reflecting unique aspects of the dynamic interaction of supply and demand for oil.

Some of the decline in the market-based measure of inflation expectations is the result of a decline in the inflation risk-premium rather than in an actual decline in the future expected rate of inflation. Most of the rest of the decline is due to a smaller "term premium," which compensates long-term investors for prospected future rate volatility. If rates are expected to remain low for a very long time, "term premium" compensation is less necessary. To the extent this is a valid conclusion it implies that the market expects inflation to remain relatively low for a long-period of time with little volatility around the long-term expected level.

Another explanation is that global monetary policies structured to force long-term rates lower have interfered with the discovery process of future inflation expectations intended to be revealed by comparing TIPS and ordinary Treasury securities of like duration without inflation protection. Long-term interest

rates for all developed economies have moved lower. In that sense lower U.S. interest rates have paralleled broader global developments. But that begs the question of why global interest rates have moved lower. Many would acknowledge that the reasons are slowing global growth and the existence of powerful deflationary forces. But by extension, can U.S. inflation really move higher on a sustained basis if the rest of the world is moving in the opposite direction? Perhaps the decline in inflation expectations embedded in U.S. Treasury security prices is not wholly due to non-germane factors.

3. Financial Conditions

Maintaining financial stability is a responsibility of the Federal Reserve. In this regard the Federal Reserve was tested repeatedly during the global financial crisis of 2008 and by most accounts responded effectively.

However, prior to the time of the financial crisis, the Federal Reserve regarded its lender of last resort role as just that. It was to respond and stabilize the financial system during times of crisis. Monitoring the fragility of the financial system and formulating monetary policy in an anticipatory manner to assure ongoing financial stability was not regarded as a primary function of monetary policy. That approach has changed in the aftermath of the global financial crisis but it still appears that the macroeconomic goal of maintaining financial system stability remains more one of reaction to developments.

That is not to say that there has been a lack of attention, but the focus has been primarily at the micro level — individual financial institutions — rather than at the macro level. The Dodd Frank Act mandated a comprehensive regulatory regime intended to assure financial strength and prudent management of individual financial institutions. Thus, financial institutions are now subject to more stringent capital and liquidity requirements. Notwithstanding these safeguards, should an individual institution get into serious trouble, the requirement for systemically important financial institutions (SIFIs) to have living wills, is intended to enable regulatory authorities to quickly and surgically resolve failures and contain the potential for systemic contagion.

To my way of thinking, as helpful as establishing rigorous prudential standards might be and preparing for prompt intervention when trouble arises, this micro approach ignores the possibility that macroeconomic policy will drive systemic financial instability rather than the acts of one or more wayward SIFIs. The Federal Reserve needs to monitor macroeconomic developments and the consequences of policy responses not just in terms of their impacts on employment and inflation but also in terms of financial system stability. There is building awareness, I believe, in the importance of this tri-part focus, but considerations of systemic financial stability are not yet robustly built into the monetary policy decision making process.

That brings us to the short-lived global financial panic at the beginning of the year. Measures of financial conditions, which appear to capture well emerging financial system instability, at least in the latter stages of their development, began to escalate during the summer of 2015. Indeed, the FOMC in response delayed the first federal funds rate hike that had widely been expected to occur in September 2015. When a degree of calm returned to markets during the fall, the FOMC proceeded to initiate monetary tightening in the U.S. at its December meeting. Financial conditions began to tighten again and full-scale panic ensued in January. Again, the FOMC responded by pulling back and the crisis passed or, what may turn out to be the case, simply went into hibernation.

This is not to argue that the FOMC was wrong to begin tightening monetary policy. After all, the labor market is near full employment and the risk of rising inflation, although not necessarily the reality that inflation will actually increase, exists. The FOMC now finds itself in the difficult position of attempting to satisfy its full employment and price stability mandates without aggravating the financial instability that is already at an elevated level in the global financial system.

Financial conditions tightened briefly in the immediate aftermath of the Brexit vote, but markets were quickly soothed by central banks promise of providing liquidity. Financial conditions quickly resumed an easing trend and stock prices headed higher. There has been one exception. Short-term dollar funding rates have risen recently, but this appears to have been caused by the impending enforcement of mutual fund reforms rather than a more general tightening of financial conditions.

GS calculates and publishes a financial conditions index. Moreover, **GS** has conducted extensive empirical research which demonstrates that tighter financial conditions slow economic growth over the next few quarters. That intuitively makes sense because tighter financial conditions reflect elevated perceptions of risks and cause market participants to act with a greater degree of caution. Riskier loans are not made and more speculative investments are deferred or avoided altogether.

GS recently included a financial conditions variable in its version of the traditional Taylor Rule, which provides guidance for calibrating monetary policy to attain full employment and price stability. **GS** posits that the effects of financial conditions on the policy interest rate are not necessarily independent of the employment and inflation components of the Taylor Rule. Because of the interactive effects, **GS** believes that a more gradual rate of monetary policy tightening in the U.S. is prudent policy. In this regard, **GS** has ratified through a model a policy that the FOMC has already embraced.

But, a gradual tightening policy may maintain a semblance of financial stability for the time being, but such a policy is not directed to dealing directly with the sources of financial instability. In that regard, such a policy is palliative, not curative. And, cynics will continue to observe, with merit, that every time that the market has a convulsion, the FOMC pulls back and, perversely, this encourages more risk-taking which worsens, rather than ameliorates, underlying financial market instability.

As I have said before, policymakers can postpone the day of reckoning, perhaps for a very long time. But, if underlying global systemic imbalances are not addressed effectively, the day of reckoning will inevitably eventually occur. And, history tells us that the longer imbalances are allowed to build, the greater will be the pain when pretend and extend policies no longer work.

4. Interest Rates — Federal Funds Rate

Most forecasters now expect the FOMC to raise the federal funds rate one more time during 2016 and the most likely time is the December FOMC meeting. Market-based expectations for a rate increase in December are about 60 percent. But the market expects only about one and a half rate increases over the next 24 months. This means that if the FOMC raises rates in December, the market currently is expecting little further tightening for more than a year thereafter. Of course, the market will revise this expectation if there is a change in the economic data or if the FOMC provides more explicit guidance about future rate increases. Almost all professional forecasters disagree with the market's sanguine expectations. However,

my econometric model's forecast of the federal funds rate in coming quarters differs little from that of the market.

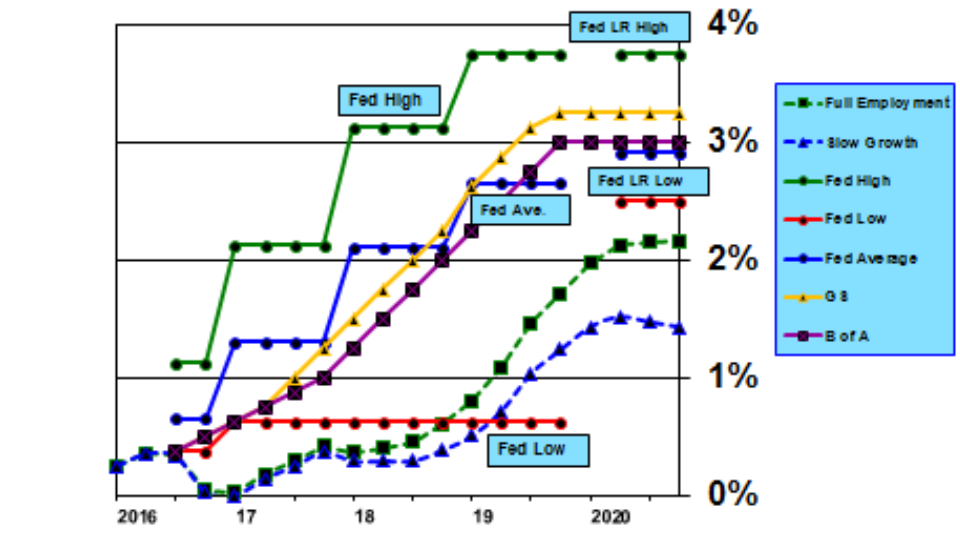
B of A has revised its forecast to only one increase in the federal funds rate during 2016 which it expects to occur in December. **B of A** expects two 25 basis points increases during 2017 and two more in 2018, which would bring the target federal funds rate range to 1.00 percent to 1.25 percent by the end of 2017 and 1.50 percent to 1.75 percent by the end of 2018.

GS has changed its forecasting approach to focus primarily on the timing of the next 25 basis points increase in the federal funds rate. **GS** now also expects only one more increase during 2016 and assigns a 65 percent probability to December, and a 35 percent probability an increase sometime in early 2017. **GS** includes three additional increases in its 2017 macro forecasts, but it has ceased to place any emphasis on this forecast, preferring instead to focus on the probable timing of only the next rate increase.

Evercore ISI updated its rate forecast following release of July's strong employment report. It pegs a December increase at 70 percent. It expects an additional two rate increases in 2017 and is skeptical of the market's forecast of less than one increase in 2017.

Chart 36 shows the quarterly progression in the federal funds rate from the present through 2020 implied by the FOMC's projections. It also shows forecasts for **B of A**, **GS**, and my "**Slow Growth**" and "**Full Employment**" scenarios.

CHART 36 – Federal Funds Rate Forecasts



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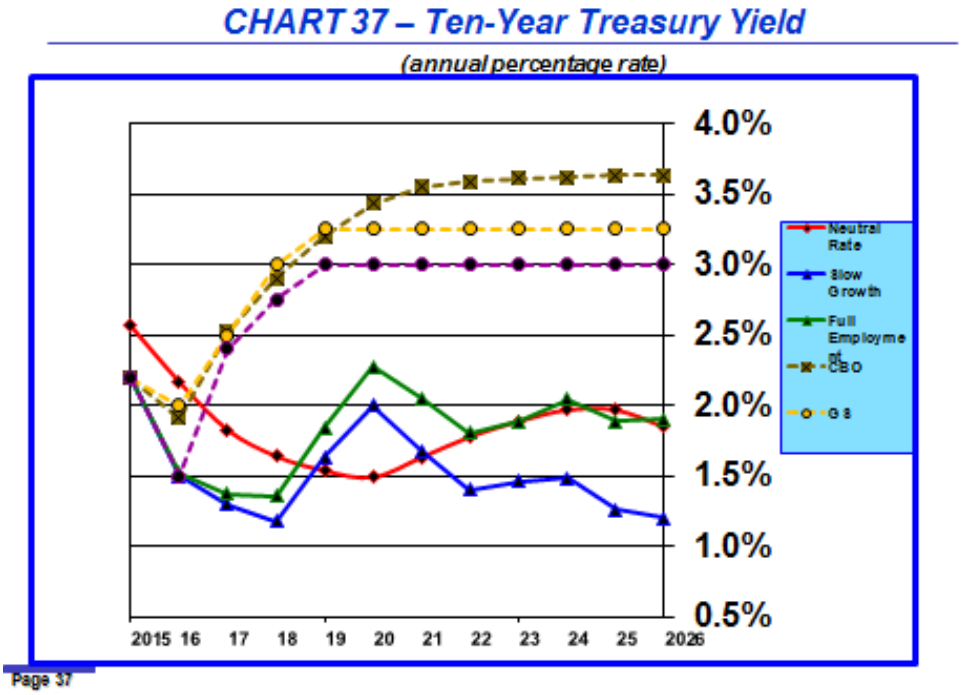
My forecasts continue to be outliers relative to other forecasters but track market-based expectations fairly closely. My forecasts are driven by my expectation that inflation will remain lower for longer than others expect and also by an even smaller expected value for the long-run real rate of interest than the 1.0 percent level now embraced by a majority of FOMC members. Short-term rates have a low probability of

increasing more than 25 basis points through 2018. The market's projection of the long-run stable federal funds rate is still lower than the downwardly revised FOMC median projection.

My view is that January's panic and June's short-lived Brexit hiccup were warning shots across the bow. The weaker dollar and lower interest rates were essential and necessary to defuse January's panic, particularly with respect to emerging markets. Brexit concerns were defused even more quickly and appear to have been driven by the market's belief that the FOMC will not raise interest rates materially for a very long time.

5. Interest Rates — 10-Year Treasury Note Yield

Chart 37 shows forecasts for the 10-year Treasury note yield over the next ten years. Analysts continue to reduce their forecasts for the ten-year yield. Partly this is a mark-to-market exercise driven by the persistent decline in this yield in opposition to expected increases. But the adjustments also reflect a growing consensus that the long-run equilibrium real rate of interest has declined. Analysts still expect long-term rates to rise from the current level, but not to as high a level.



B of A's revised long-term ten-year yield forecast seems a bit odd since the 3.0 percent level is exactly the same as its 3.0 percent forecast for the federal funds rate. Longer term interest rates typically include a positive term premium. This implies that **B of A** is forecasting a negatively sloped yield curve, net of the term premium, in the long run, which customarily is indicative of expected very low inflation or even modest deflation. However, **B of A's** long-term inflation forecast is 2.0 percent. That implies that the long-term real rate of interest is just 1.0 percent. However, **B of A** has suggested that there is a good chance that the long-run level of the federal funds rate could be lower than 3.0 percent. That would address

the apparent inconsistency in **B of A's** current long-run forecasts of 3.0 percent for both the federal funds rate and the 10-year Treasury rate.

My estimate of the nominal long-term neutral nominal rate for the 10-year Treasury in my "**Slow Growth**" scenario oscillates between 1.0 and 2.0 percent over the next ten years, which implies a real rate that is zero or negative, assuming that the FOMC is successful in pushing the inflation rate to 2.0 percent. The estimated neutral real rate of interest is zero in the "**Full Employment**" scenario, assuming inflation of 2.0 percent, but modestly positive given my slightly lower inflation forecast.

Over the next four years my model forecasts that the 10-year yield will rise 28 to 57 basis points from its recent level to 2.03 to 2.31 percent (see **Table 15**). The favorable effects of slowing labor force growth, *based upon **CBO's** assumptions*, and improving financial conditions partially offset the negative effects of firming inflation and improving productivity.

Table 15
Changes in 10-Year Treasury-Note Yield
(Basis Points)

	Labor Growth	Labor Gap	Productivity	Inflation	Financial Conditions	Other	Total
"Full Employment" Scenario							
2016-2020	-92	-9	50	205	-79	-19	57
2021-2026	-14	-5	87	-57	-17	-32	-37
2016-2026	-106	-13	137	148	-95	-51	19
"Slow Growth" Scenario							
2016-2020	-99	-14	30	204	-79	-19	28
2021-2026	-10	-10	76	-80	-17	-32	-80
2016-2026	-110	-25	106	123	-95	-51	-51

After 2020, with slowing employment growth and benign inflation there is little upward pressure on the 10-year yield other than potential improvements in productivity, which appear elusive at the moment.

APPENDIX

Outlook — 2016 and Beyond — Forecast Summary for the U.S. and the Rest of the World, Highlights of Key Issues, and Identification of Risks

Observations about the 2016 U.S. and global economic outlook and risks to the outlook are listed below.

Financial markets started the year off in ugly fashion with stock prices plunging in all global stock markets, prices of commodities in free fall, and long-term bond yields heading toward zero in many global markets. Concerns about slowing global growth and potential recession in the U.S. were amplified by unexpectedly weak data reports during the opening weeks of 2016. Consequently, many forecasters lowered their estimates of economic activity during 2016, but virtually none expected recession.

Market sentiment reversed rather abruptly in late February and data reports since then have generally been more upbeat, particularly in the U.S. Thus, it is not at all surprising that recession fears faded into the background.

In late June the British vote to leave the European Union reverberated through global financial markets. Although Brexit is likely to result in significant consequences, particularly for the U.K. and E.U. economies over time, the market quickly determined that interest rates would remain much lower for longer and reverted to "risk-on" dynamics, driving U.S. stock prices to an all-time high and U.S. interest rates to the lowest level in the 240-year history of the nation.

Nonetheless, the 2016 U.S. and global growth outlooks generally are shaping up to be less favorable than when forecasts were prepared in December 2015.

1. **U.S.** — **August Assessment:** relatively steady growth, but some indications that growth may be weakening

   ✓ ***The Federal Reserve's Beige Book report for August 2016 reflected an economy that is growing slowly with no real directional momentum.***

   ✓ ***Consumer spending slowed from an above trend pace in the second quarter***

   ✓ ***Manufacturing production fell 0.4 % in August and is down 0.4% over the last 12 months***

   ✓ ***GS's Current Activity Indicator, which tracks real GDP growth, dipped to 0.9% in August, but the three-month average is a more respectable 1.7%***

   - ***2016 real GDP Y/Y*** growth projections range from 2.3% to 2.5%. The FOMC's central tendency Q4/Q4 projections range from 2.3% to 2.5%. (Q4/Q4 projections are highly dependent upon potential anomalies in Q4 data; therefore, Y/Y estimates, which average all four quarters, usually are more stable estimates.) Risks are tilted to the upside because of the substantial federal tax reductions and spending increases Congress enacted at the end of 2015.

     - Based upon GDP revisions and Q2 "Preliminary Estimate," B of A and GS have reduced their estimates of 2016 year-over-year growth to 1.5%; my estimate is now 1.1% (note that my lower

estimate results from slowing employment growth and the cumulating effects of recent negative productivity); the FOMC reduced it's 2016 Q4/Q4 projection range from 2.3%2.5% to 1.9%2.0% in June prior to recent data updates; IMF forecast 2.2% growth in early July prior to data updates

- The preliminary real GDP estimate for Q2 was revised down to 1.1%, but would have considerably higher without a rare decrease in inventories; Q4 2015 was revised down from 1.4% to 0.9% and Q1 2016 was revised down from 1.1% to 0.8%; as a consequence the year over year growth rate collapsed to 1.2% for the four quarters from Q2 2015 to Q2 2016

? The final estimate of Q2 real GDP is likely to be revised up to 1.5%, bringing year over year growth up to 1.3%; estimates of Q3 real GDP growth range between approximately 2.8% (B of A) and 3.0% (GS)

- ***Real GDP output gap*** will remain high, but will close rapidly during 2016 from about 2.6% to 2.0%. (***CBO revised potential GDP assumptions in January and again in August; these revisions along with BEA's revisions to GDP data in July reduced the beginning of the year output gap from 2.6% to 1.65%; CBO's revised forecast is for the output gap to close to 1.35% during 2016. Other analysts believe the current output gap is smaller than CBO's estimate.***)

  - OECD's U.S. output gap estimate is 1.8% at the end of 2016 and 1.2% at the end of 2017

  - My current estimate of the output gap at the end of 2016 is between 2.2% and 2.3%, reflecting my very weak forecast of annualized real GDP growth during the second half of 2016 of about 0.5% compared to CBO's forecast of 2.75%, which is similar to GS and B of A forecasts; it is likely that my forecast is too pessimistic because of how my econometric model incorporates the lagged effects of very low productivity, but there is a reasonable chance the final 2016 gap will fall between CBO's and my estimates

- ***Potential structural rate of real GDP growth*** has declined significantly in recent years. I expect potential growth to be about 1.4% in 2016. Long-term potential real GDP growth will edge up in coming years to between 1.8% and 2.1%.

  + My current estimate of potential growth in 2016 remains at 1.4%

  - B of A reduced its estimate of long-term potential growth to 1.7%; GS's estimate is 1.75%; JPMorgan's 1.5% long-run estimate is more pessimistic.

  + CBO's updated long-term potential estimate is 1.9%; and the FOMC's central tendency range is 1.8%2.0%

  + My long-term potential estimate is between 1.75% and 2.05%, but this range assumes that long-run productivity gains will be between 1.45% and 1.7%, which may prove to be optimistic

- ***Productivity*** should rise during 2016 as growth improves and investment increases, but should still fall well short of the historical 2.1% average.

  - Nonfarm productivity was 0.45% in 2015; the five-year average was 0.45%; my current productivity projection for 2016 is -0.2% to -0.4%; B of A's is -0.3%

- ***Employment*** growth should slow considerably during 2016 as full employment is reached and slow growth in the labor force becomes binding; payroll growth should average 130,000 to 165,000 per month.

- Payroll employment increased an average of 182,000 per month over the first eight months of 2016

- ***Employment participation*** will be relatively stable during 2016 as labor market conditions tighten and discouraged workers find jobs, offsetting the demographically-embedded decline stemming from retirements of baby boomers.

  + Participation was 62.82% in August compared to 62.65% in December and up slightly from its low of 62.42% in September 2015

  ? Prior to the July and August payroll reports, GS estimated that the remaining participation gap is about 0.3% or approximately 800,000 workers; this translates into a gap of 0.5% in the U6 unemployment rate, of which 0.2% is a shortfall of full-time employees, 0.2% is due to higher than normal involuntary part-time employment and 0.1% is due to higher than normal marginally attached workers

- ***Unemployment rate*** should edge down to between 4.6% and 4.8%.

  ? Unemployment rate was 4.92% in August slightly above the long-term structural rate of 4.74%, according to CBO

  ? Based on the U-3 measure, the economy is very close to full employment

  ? U-6 unemployment rate, which adds marginally attached workers and those working part-time for economic reasons to the number unemployed but looking for work, was 9.69% in August, which is about 0.6% above the historic full-employment level

- ***Nominal consumer disposable income*****,** measured on a Y/Y basis should slow as employment growth slows; this will be offset partially by an increase in average hourly wage rates; growth should be in a range of 2.2% to 2.5%.

  - Disposable income growth in July was 3.7% ahead of the year earlier level due to strong employment gains during the last year; growth is projected to fall to 3.2% by the end of 2016 provided that employment growth and total hours worked slow

- ***Nominal consumer spending growth*** on the Y/Y basis will be relatively stable in a range of 3.3% to 3.5%.

  + Nominal spending growth over the past year as of July was rising at a 3.4% annual pace; I project nominal spending growth in 2016 to be approximately 3.5%

  ? Growth in consumer spending was weaker than expected in the first quarter, but was very strong in the second quarter; however, ISI's survey of state tax revenues indicates that sales tax collections, which are heavily influenced by auto sales, are declining, which suggests that consumer spending growth will slow down over the second half of 2016; retails sales growth was weak in both July and August

  - Auto sales in August have fallen 3.4% over the last year

  ? Consumer sentiment measures have been relatively soft in recent months, oscillating in a narrow range: University of Michigan's index was 89.8 in September compared to 89.8 in August, 90.0 in July and 93.5 in June; it was 87.2 a year ago; the Conference Board's measure was 101.1 in August compared to 96.7 in July, 97.4 in June, 92.4 in May, 94.7 in April, and 96.2 in March, and was down slightly from 101.3 a year ago; Evercore ISI's weekly company surveys index has been edging down and has fallen from 52.4 to 49.6 since March 2015, but it is up from the recent low of 47.7 in late April

- ***Household personal saving rate*** will decline slightly as growth in spending exceeds growth in disposable income.

  ? In July the Bureau of Economic Analysis revised the saving rate sharply higher for the last several years

  - The revised saving rate was 5.87% over the first seven months of 2016 compared to the revised 2015 average rate of 5.80% (prior to revision the 2015 saving rate was 5.12%) (nominal income growth has exceeded spending growth so far in 2016)

- ***Stock prices***, as measured by the S&P 500 average, should be between 5% higher or lower, reflecting the slowing growth in profits and rising short-term interest rates.

  ? Stock prices are up 6.5% since the beginning of the year

- ***Manufacturing*** will continue to be weak with the PMI index just slightly above or below 50.

  + The PMI manufacturing index fell into contractionary territory in August at 49.4 compared to 52.6 in July, 53.2 in June, 51.3 in May, 50.8 in April, 51.8 in March, 49.5 in February, 48.2 in January and 48.0 in December; other manufacturing indices indicate ongoing weakness

  + The PMI non-manufacturing index plunged to 51.4 in August from 55.5 in July; it was 56.5 in June, 52.9 in May, 55.7 in April, 54.5 in March 53.4 in February, 53.5 in January, and 55.8 in December; the August reading was the lowest level since February 2010, early in the recovery from the Great Recession; this decline is corroborated by the Markit service PMI, which declined to post-Great Recession low of 50.9 in August

  + The NFIB optimism index for small businesses fell slightly to 94.4 in September from 94.6 in July and August, compared to 94.5 in June, 93.8 in May, 93.6 in April, 92.6 in March, 92.9 in February, 93.9 in January, and 95.2 in December, reflecting stable but moderate growth; however, this index remains below its recent cyclical peak of 100.3 reached in December 2014

  + GS's business conditions index has been in contraction territory for the past two months at 49.2 in August and 47.1 in July. Monthly index values in 2016 were 55.5 in June, 48.6 in May, 44.9 in April, 46.5 in March, 40.4 in February, 39.9 in January, and 48.6 in December; this indicator has been above 50 only once in the last 17 months (a value of 50 indicates trend growth; thus, business conditions were below trend for 14 months until June)

- ***Business investment*** spending growth should edge down slightly and be in a range of 2.0% to 3.5% as employment and consumer spending growth slows.

  - Business investment fell at an annual rate of -2.2% in the first half of 2016, reflecting in part energy investment cutbacks; however, investment in non-energy areas has fallen short of expectations

  - GS expects business investment to rise at a rate of 3.1% in the second half of 2016, but fall -0.5% on a year over year basis during 2016; B of A expects business investment to decline -0.5% in 2016

  ? An Evercore ISI mid-2016 survey indicates that U.S. capital spending plans have moderated during 2016 and global capital spending plans have turned negative for the first time since the survey began in 2010

  ? An Evercore ISI mid-2016 survey indicated that inventories were above optimal levels, particularly for industrial companies

? Average age of U.S. government infrastructure has declined from about 18 years in the 1950s to 27 years in 2014

- ***Residential housing investment*** should remain relatively strong in a range of 6% to 8%, but should edge down a bit from 2015's level; housing starts should rise 10% to 15%.

  - Residential housing investment rose 7.8% in Q1 but fell -7.7% in Q2; growth is currently expected to be 4.8% to 5.8% in 2016

  - Over the first eight months of 2016 housing starts are 4.7% above 2015's average, but 6.7% above the first eight months of 2015, which is below the expected growth

- ***Residential housing prices*** should rise more slowly in 2016 in a range of 2% to 4% in 2016.

  ? B of A currently is forecasting housing prices to increase 3.6% in 2016 instead of 1.8% it expected at the beginning of the year, but commented that risks are in the direction of an even greater rate of increase; GS expects prices to increase 3.9%

  ? The Federal Housing Finance Agency's purchase only price index rose 5.6% over the 12-month period through June 2016

  + The University of Michigan July survey reported a decline in the net percentage of respondents believing it is a good time to buy a home to 12% — this decline in sentiment may indicate that prices have moved high enough to depress demand — longer run a slowing in price increases is likely

- ***Trade deficit*** should rise in 2016 as the increase in the value of the dollar continues to depress exports and increase imports. The ***dollar's value*** on a trade-weighted basis should rise slightly. (Trade data were revised for the last several years in April 2016, which reduced the size of the deficit, with reductions being greater in more recent months)

  - The trade deficit has fallen slightly over the last 12 months from 2.73% to 2.66% in July

  - Through August the trade-weighted (major currencies) value of the dollar has fallen 4.6% since December

- ***Monetary policy*** — the Federal Reserve will raise the federal funds rate two to three times during 2016 in 25 basis point increments.

  - The FOMC has yet to raise rates in 2016; at the September FOMC meeting 3 of 10 members voted to raise rates; the FOMC signaled in its monetary policy statement that risks to the economic outlook are "roughly balanced," which markets interpreted to mean that rates will be raised 25 basis points in December; the FOMC's "dot plot" substantiates this expectation; B of A expects a 70% probability of one increase by December, and GS has a probability of 65% for an increase by December; my econometric model indicates no additional increases for at least another one and a half years, which is consistent with current market expectations

  ? Some FOMC members feel that the FOMC should raise the federal funds rate by 25 basis points at its September meeting and Vice Chairman Fisher has suggested that two increases before the end of 2016 are possible; many believe an increase in September, let alone two by December, would be a serious policy mistake; the FOMC is likely to remain on hold at the September meeting

- ***Total inflation*** measures (CPI and CPE) will rebound sharply in 2016 as the depressing effects of 2015's collapse in oil prices passes out of the indices.

  + B of A expects CPI to rise from 0.7% in 2015 to 2.3% in 2016 and PCE to rise from 0.6% to 1.4%

- ***Core PCE inflation*** will be relatively stable in a range of 1.2% to 1.6%, reflecting global disinflationary trends offset somewhat by the closing U.S. employment and output gaps. Core PCE inflation will remain well below the FOMC's 2% objective at least through 2018 and perhaps much longer.

  - Core PCE inflation forecasts have been raised to 1.7%; FOMC's June projection range for 2016 was raised to 1.6%1.8%; my 2016 forecast for core PCE inflation is 1.4%

- The ***10-year Treasury rate*** is likely to fluctuate in a range between 2.25% and 2.75% in 2016. Faster than expected real GDP and employment growth would push the rate toward the top end of the range; greater than expected declines in inflation and/or heightened financial instability would push the rate toward the bottom end of the range.

  - The 10-year rate was 1.63% on September 22

- ***Fiscal policy*** will have a positive impact on real GDP growth during both fiscal year and calendar year 2016, raising real GDP growth by 0.4 to 0.6%. The deficit as a percentage of nominal GDP will increase substantially from fiscal year 2015's level of 2.46% to a range of 3.25% to 3.50%. Stronger than expected growth would push the deficit toward the lower end of the range.

  - With GDP revisions, the 2015 calendar year fiscal deficit was 2.62%; both growth and the deficit are rising less rapidly than forecast; the 12-month cumulative deficit to GDP ratio was 2.84% in August 2016 compared to 2.34% in August 2015 but is expected to rise to approximately 3.18% by the end of 2016

- ***State and Local investment*** spending growth should range between 1.5% and 2.0%.

  ? The Bureau of Economic Analysis revised state and local investment growth much higher in 2015 from 1.36% to 2.92%

  - State and local investment spending grew at an annual rate of 0.6% in the first half of 2016, but is expected to increase 1.2% for all of 2016

2. **Rest of the World: August Assessment:** current activity ebbed a bit in August continuing a lackluster trend; over the remainder of the year risks are tilted to the downside

   ✓ ***OECD index of leading global indicators has declined for much of the year and reached its lowest level since euro crisis in 2012 at mid-year; however, this indicator improved slightly in July and August***

   ✓ ***J.P. Morgan Global Manufacturing PMI decreased to 50.8 in August from 51.0 in July***

   - ***Global growth*** is likely to improve to 3.4% in 2016 from 3.1% in 2015. Risks are tilted to the downside.

     - Global growth forecast has declined to 3.0% in 2016 (IMF July forecast is 3.1%)

     - The global manufacturing index is in a declining trend and at 51.6 in August indicates modest growth

     - The OECD leading indicator declined to its lowest level since the Great Recession early in 2016 but improved slightly in July and August

- ***European growth*** will be positive but will likely fall short of the consensus 1.7% as the benefits of 2015's fall in the value of the euro wane and social and political disruptions occur.

  - European growth forecast has declined to 1.5% in 2016, (IMF July forecast is 1.6%); growth is expected to decline to 1.1% in 2017

- ***European inflation*** will rise from 2015's 0.1% but will probably fall short of the expected 0.9%.

  - Final 2015 European inflation was 0.0%; 2016 forecast is 0.2% and 2017 forecast is 1.0%; currently, core inflation is 0.9%

  - The ECB is slowly losing its battle to push inflation to 2.0% as reflected in market long-term inflation expectations, which have declined below 1.5%

- ***European financial markets*** should be relatively stable with periodic episodes of volatility prompted by specific events.

  - European stock markets declined broadly in early 2016; bank stocks plunged 45% during the first half of 2016 to a level not experienced in 30 years; however, stock prices rallied vigorously in March as panic subsided and the ECB ramped up monetary easing; nonetheless, bank stocks continue to underperform and underperformance worsened after the Brexit vote, a worrying development

  - German business expectations fell sharply in June to the lowest level since the euro crisis in 2012.

- ***European political dysfunction, populism and nationalism*** will continue to worsen gradually. Countries to watch closely include Greece, Spain, Italy and Portugal.

  + Political fragmentation is worsening slowly; the immigration crisis is hollowing out centrist political parties

  + Spain's new election was inconclusive and no government has yet been formed

  + Italy's banking crisis is heating up and could contribute to a defeat of Renzi's November or December constitutional referendum, followed by Renzi's resignation and probable new elections

  + Greece's third bailout is increasingly in jeopardy of failing; however, Greece's parliament has enacted spending cuts and tax increases necessary to meet the requirements for disbursal of funds under the current bailout agreement; debt relief is necessary according to the IMF — creditors have promised to consider that possibility in 2018 after the next set of French and German elections

- ***U.K. growth*** is expected to remain a solid 2.5% in 2016 compared to 2.4% in 2015; some risk to this outlook could evolve from the proposed referendum for the U.K. to leave the European Union.

  - In the aftermath of the Brexit "Leave" vote, U.K. growth forecast has been reduced to 1.8% in 2016 and 0.7% in 2017 (IMF forecast is 1.7% in 2016 and 1.3% in 2017)

  - U.K. consumer confidence plunged following the Brexit "Leave" vote but has recovered

  - Both the manufacturing and services purchasing managers indices fell into contraction territory in July but rebounded in August

- ***China's GDP growth*** will slow below 6.5% and could be as low as 6.0% by the end of 2016 as economic reforms are implemented and the shift to a consumer-focused economy gathers momentum.

- China reported year-over-year real GDP growth of 6.7% through the second quarter of 2016

+ China's 2016 GDP growth is forecast to be 6.4% (IMF July forecast is 6.6%)

? The difference between reported results and forecasts is that policy makers have deliberately taken actions to boost housing construction and public investment, which has resulted in a short-term boost to the economy; however, this force-feeding of economic growth could worsen future economic performance as debt leverage continues to grow faster than economic output

- ***China's leadership*** will continue to be slow in implementing ***economic reforms*** but financial and political stability will be maintained.

  + President Xi's anticorruption campaign and centralization of power is smothering the consensus governance approach in place for the last 30 years and may be creating latent political instability

- ***Japan's*** economic policies will continue to fall short of achieving the 2.0% inflation target; inflation is expected to rise from 0.5% in 2015 to 1.0% in 2016. GDP growth will also continue to fall short of the policy target, but should rise from 0.7% in 2015 to 1.2% in 2016. Population decline and slow implementation of market reforms will continue to weigh heavily on both growth and inflation.

  - Japan's economy grew 0.6% in 2015; the 2016 growth forecast has been revised down to 0.6% (IMF July forecast is 0.3%)

  - Japanese markets responded very negatively to the Bank of Japan's imposition of negative interest rates early in 2016; the yen has strengthened; the Bank of Japan disappointed markets again in July with a more modest easing of monetary policy than expected

  - Inflation is now expected to be -0.2% in 2016

  - Evidence is increasing that Abenomics is failing: only 36% of businesses surveyed by Evercore ISI in the second quarter expect conditions to improve compared to 83% in the first quarter; the yen continues to strengthen, which will depress profits, thus only 36% expect to increase prices compared to 58% in the first quarter

  - There is increasing skepticism that the Bank of Japan can do much more to boost inflation and economic growth

  - Abe's political position was strengthened by the outcome of the recent elections in the Upper House

  - A substantial fiscal stimulus program has been announced, which includes significant infrastructure spending and Kyushu earthquake recovery spending; though there is much talk about helicopter money, the Bank of Japan is legally prohibited from outright "printing" of money and has taken few additional monetary policy easing steps, but more is expected

- ***India*** should continue to experience relatively strong real GDP growth in a range of to 6.0% to 7.0% in 2016.

  + IMF is forecasting 7.4% GDP growth

  ? Prime Minister Modi has had difficulty getting parliament to pass economic reforms, which has held back growth potential

- ***Emerging market countries*** should experience better growth in 2016 than in 2015 when falling prices for commodities depressed economic activity in many countries.

- Declines in the prices of commodities and capital outflows have depressed growth in most emerging market economies in 2016; however, easier U.S. monetary policy and rebounding prices of commodities have averted a potential meltdown

- 2016 GDP forecast has been revised downward from 4.3% to 4.0% and is 2.8% if China is omitted

- ***Brazil, Russia, and Venezuela*** will continue to struggle the consequences of the steep decline in the prices of commodities and particularly in the price of oil.

  + Economic and political conditions continue to deteriorate in all three countries; escalation of political tensions and the potential for social disruption is greatest in Venezuela; political stability may be re-emerging in Brazil with the impeachment and removal of President Dilma Rousseff

  + Russia's 2016 GDP forecast has been revised from -1.0% to -1.8%

  + Brazil's 2016 GDP forecast is -3.5%

3. **Risks** — stated in the negative relative to the forecast (+ risk realized; - risk not realized).

   - ***U.S. potential real GDP growth*** falls short or exceeds expectations; falling short is the more serious risk

     + Forecasts of actual 2016 growth have been reduced; lower than expected productivity, if sustained, will depress potential growth

   - ***U.S. employment growth*** is slower or faster than expected; slower growth is the more serious risk

     - Employment growth over the first eight months of 2016 has been slightly above the upper end of the expected range

   - ***Employment participation rate*** rises rather than remaining stable or falling modestly

     - The participation rate has been relatively stable

   - ***U.S. hourly wage rate growth*** falls from its 2015 level of 2.2% or rises much more rapidly than expected; falling wage growth is the more serious risk

     - Risk not realizedaverage hourly wages of all employees have risen slightly from 2.30% in December to 2.49% in July (12-month moving average); however, the rate of increase in weekly average wages has fallen from 2.42% in December to 2.08% in July as the length of the workweek has decreased; other measures of wages indicate a slight acceleration in the growth rate

   - ***U.S. Unemployment rate*** falls less than expected

     - Risk not realized, unemployment rate is slightly above the year-end expected range

   - ***U.S. productivity*** remains below 1%

     + Productivity fell at an rate of -0.6% in the first half of 2016 and has fallen -0.4% over the last four quarters; little improvement over the remainder of 2016 seems likely

   - ***Real U.S. consumer income and spending*** increase less or more than expected; less than expected increases are the more serious risks

     + Income is rising faster than forecast and spending is rising about as expected

   - ***U.S. stock prices*** fall more than or rise more than the expected range of -5% to +5%

     ? Stock prices are up 6.5% year to date

? The Wilshire index of stock prices is 122% of nominal GDP, which is an extremely high level last experienced during the dot.com bubble peak in 2000, suggesting that stock prices are significantly overvalued

- ***Growth in U.S. residential housing investment and housing starts*** are less than or more than expected; below expectations is the more serious risk

  + Housing investment growth is slightly below the expected range

  + Housing starts are rising more slowly than expected

- ***U.S. residential housing price increases*** are less than expected

  - Risk not realized; prices are rising faster than expected, although the rate of increase is expected to slow during the remainder of the year

- ***U.S. private business investment*** does not improve as much as or more than expected; falling short of expectations is the more serious risk

  + Business investment declined during the first half of 2016 and is expected to be negative for the entire year

- ***Oil price declines*** that occurred in 2015 trigger bankruptcies and cause tighter financial conditions with negative implications for economic activity and growth

  - Early in the year it appeared that this risk might be realized; however, the rebound in the price of oil has delayed, perhaps prevented, realization of potential problems

- ***U.S. manufacturing growth*** contracts or expands more than expected; contraction is the more serious risk

  - Risk not realized

- ***U.S. trade deficit*** does not widen as expected

  + Deficit has declined slightly

- ***Value of the dollar*** rises substantially

  - Risk not realized; value of the dollar has declined slightly since December

- ***U.S. monetary policy*** spawns financial market uncertainty and contributes to financial instability

  - Risk was realized briefly at the beginning of the year but has abated due to less aggressive monetary policy and a weaker U.S. dollar; financial conditions tightened only modestly and temporarily following Brexit

- ***U.S. inflation*** decelerates, rather than remaining stable or rising as expected

  - Risk not realized; inflation rising a bit more rapidly than expected

- ***U.S. interest rates*** fall *or* rise more than expected

  + Risk realized; rates have fallen much more than expected

- ***U.S. fiscal policy*** is more expansionary than expected

  - Risk not realized — increase in spending about as expected

- ***Federal budget deficit*** increases more than expected

  - Risk not realizeddeficit about as expected

- ***U.S. state and local spending*** does not rise as fast as expected

+ Spending expected to increase slightly below the bottom end of the forecast range

- ***Global GDP growth*** does not rise as fast as expected

  + Risk realized

- ***European growth*** is considerably less than expected

  + Risk realized — modest reduction in forecast growth

- ***ECB's*** quantitative easing program is not successful in raising inflation and stimulating the European economy

  + Risk realized — inflation forecast is 0.2% for 2016; IMF estimates a 35% probability that Europe is headed to deflation

- ***Europe*** — financial market turmoil reemerges

  - Risk realized temporarily early in the year; ECB's monetary policy has been successful in maintaining financial market stability; bank stocks have performed poorly relative to other industries, reflecting continuing investor concerns about profitability and problem loans; however, bank stock prices have rallied recently based on speculation that the ECB will moderate its quantitative easing policy in 2017; markets appear to have taken the Brexit "Leave" vote in stride

- ***Europe*** — political instability and social unrest rises more than expected threatening survival of the Eurozone and the European Union

  + Risk realized — euro skeptic parties continue to gain ground and are forcing centrist parties to take policy positions that feed centrifugal forces eating away at the cohesion of the European Union

- ***Chinese*** leaders have difficulty implementing ***economic reforms***

  + Risk realized — reforms have been delayed in favor of economic stimulus implemented primarily through debt leverage via state-owned banks and the municipal bond market

- ***China's growth*** slows more than expected

  - Risk not realized — policy makers are pulling out all the stops to hit the target growth rate; this will eventually backfire, but not during 2016

- ***Japan*** — Abenomics and monetary policy are unsuccessful in raising inflation to the 2 percent target and economic growth continues to be below expectations

  + Risk realized — yen has strengthened, profits are eroding, wage increases are being scaled back; a new major fiscal stimulus initiative has been announced

- ***New Risk — Political risk is building in Russia as Putin's mandate frays***

- Severe and, of course, unexpected ***natural disasters*** occur, which negatively impact global growth

  ? Consequences of Japan's Kyushu earthquakes appear to have been confined to Japan

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