The Longbrake Letter*

Bill Longbrake**

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I. Is Today's Euphoria the Precursor of the Next Financial Crisis?

Optimism abounds across the globe and world economies are benefiting from years of easy monetary policy. Momentum is incredibly powerful and is currently self-reinforcing. Practically all economies are growing above potential and slack has already disappeared or is disappearing rapidly.

In the case of the U.S., there is no slack in the labor market and the remaining slack in output is shrinking rapidly. Enormous fiscal stimulus embedded in the "Tax Cuts and Jobs Act," disaster relief spending, and substantial increases in defense and discretionary spending caps will lift growth substantially above potential in 2018 and probably in 2019 as well. When an economy has no slack, and operates well above its potential, it risks overheating and that triggers upward pressures on prices and accelerates the buildup of imbalances in the economy. We are in the mature phase of the business cycle and the added stimulus will propel the economy higher in coming months, perhaps dangerously so.

Best to enjoy the good times now because we know from history that strong economic momentum, when the economy is operating at or above full capacity, eventually leads to recession and correction of the imbalances that built up during the euphoric period of overly strong growth.

In response to overheating in the labor market and economic output exceeding its non-inflationary potential, the Federal Reserve will continue to tighten monetary policy systematically. The Federal Open Market Committee now projects that the federal funds rate will need to rise 50 basis points above its median estimate of the long-term full-employment equilibrium level. Of course, everyone hopes that

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policymakers will be able to engineer a soft landing, but history is not supportive of such a benign outcome.

At a recent meeting of the Conference of Business Economists in Washington, DC (I am a member), a large number of members worried that the probability of recession is rising and that 2020 is the most likely time for onset. One member boldly predicted that the next recession would begin on June 20, 2020. This approximate timing for the next recession is an emerging consensus among most seasoned economic forecasters. Indeed, some fear that earlier onset is a nontrivial possibility. I would hasten to add, however, that barring some unexpected major geopolitical crisis, optimism and euphoria tend to extend the life of economic expansions for longer than seasoned forecasters customarily expect.

Unlike professional economic forecasters, there is no substantive evidence yet that financial market participants are worried about a recession occurring in the next 12 to 30 months, which may well be good reason for the next recession to be farther away than most forecasters expect.

Desmond Lachman, an economist at the American Enterprise Institute, recently summarized the traditional end-of-cycle arguments for imminent recession.[1] "*The last thing that a U.S. economy close to full employment and with rising inflation expectations now needs is an expansionary budget policy …* [which] *is bound to add considerable pressure on the Federal Reserve to raise interest rates to prevent the U.S. economy from overheating. ... In putting the economy on the path to higher interest rates than the Federal Reserve is currently anticipating, the administration seems to have forgotten the searing 2008-2009 experience of how rising interest rates led to the bursting of the U.S. housing and credit market bubbles. This is all the more to be regretted considering how much more pervasive asset price bubbles and credit risk mispricing are in today's global economy than they were a decade ago."* For good measure, Lachman adds his concern about the potential negative consequences of "beggar-thy-neighbor" trade policies. Earlier this year Lachman flat out predicted that the next recession would begin in early 2019, although he has been silent on this score recently.

Anatole Kaletsky, a generally optimistic equity analyst for Gavekal Dragonomics, recently penned an article, "What – Me Worry?" after attending the Milken Global Conference in Los Angeles.[2] "*Should we worry that Congress has lifted public spending ceilings at the same time as Trump's tax cuts are creating trillion dollar*

[1] Lachman, Desmond. "The Economic Consequences of Donald Trump," American Enterprise Institute blog post, May 4, 2018.
[2] Kaletsky, Anatole. "What – Me Worry?" Gavekal Research, Gavekal Dragonomics, May 8, 2018. (This is proprietary research which is not available to the general public.)

deficits in an economy already at full employment? No, said Treasury Secretary Steven Mnuchin, because US growth will accelerate to 3% and automatically eliminate deficits. And anyway, according to several of the other speakers, tax cuts will eventually force cuts in government spending, and Medicare and Social Security to be reformed. … Will rising bond yields or tightening Federal Reserve policy undermine the economy or Wall Street? Not according to Mnuchin, since interest rates are going up because the economy is doing better – 'and that is a good thing'. … I could go on and on … What are the investment implications of all of this euphoria? Bear markets always begin when the sun is shining. … when we see economic and policy risks clearly mount, even as optimism soars to euphoric levels, as it has in the American business community since the Trump tax cuts, it is prudent to assume that the upside is limited and look for better investment opportunities elsewhere." Kaletsky remains optimistic, but less so about U.S. equity markets.

Leading up to the 2008-2009 financial crisis, it was clear to a few that the U.S. real estate market and securities linked to that market were an enormous bubble waiting to burst and wreak havoc on financial markets and the economy. Most, however, were oblivious to the mounting risks. Well, the bust occurred and it was even worse than the prophetic pessimists anticipated.

Looking at the current situation, there does not appear to a particular economic or financial sector that is as overextended as was the case with real estate in 2005-2008. Furthermore, many take comfort that the Dodd-Frank reforms, which increased capital ratios and liquidity requirements for financial intermediaries, have built in sizable buffers that will prevent the kind of disruptive contagion which punctuated the dark days of the 2008 mayhem that gripped global financial markets. Thus, most, as was the case prior to the 2008-2009 crash, are sanguine about current prospects – they do not see catastrophe ahead. Perhaps the majority is right. But, as Carmen M. Reinhart and Kenneth S. Rogoff discussed in their now famous book, "This Time is Different: Eight Centuries of Financial Folly," (it wasn't) mega financial crises recur again and again. Humankind seems destined never to learn from the past. Euphoria and greed perpetually overwhelm reason. Few see disaster looming.

So, if financial Armageddon is yet again at hand, what will be the trigger? At first glance, unlike 2008 there is no specific sector of the financial markets or the economy of consequence that appears to be an over-inflated bubble poised to burst. This absence of a highly visible smoking gun has prompted most to buy into the view that the economy will continue to grow steadily and that risks are limited and containable with the help of current regulatory safeguards.

Danielle DiMartino Booth says nonsense to this complacency. There is a smoking gun and it is staring us in the face. It is the monetary policies of global central banks over the past decade.[3]

Following the Great Financial Crisis, global economies were in deep trouble and price deflation threatened to inflict further damage. In response, beginning with the U.S. Federal Reserve and the FOMC, but quickly spreading to all the developed countries, central banks aggressively implemented non-traditional monetary tools, primarily large-scale asset purchases (quantitative easing) to depress interest rates. The intent was to stimulate economic activity and lift inflation.

Booth observes, referring to monetary policies in the early 2000s: "*As is always the case when interest rates are suppressed for far too long, nefarious behavior broke out in the credit markets."* If anything, recent monetary policy not only suppressed interest rates for far longer, but quantitative easing injected copious amounts of liquidity into global financial markets. Reflecting this, Booth quoted Peter Boockvar, Chief Investment Officer of Bleakley Advisory Group and editor of The Boock Report: "*Today's bubble is in central bank balance sheets and the massive monetary inflation that's created oceans of liquidity*." Booth goes on to warn that "*The biggest risk to the economy and the financial markets is thus the reversal of these balance sheet builds and the 'normalizing' of interest rates*." She adds that *"[it] is not stock market volatility that will be the primary disruptor, but rather volatility in the credit market*."

As the FOMC raises interest rates and shrinks its balance sheet, the U.S. and global financial systems will be progressively starved of liquidity. Funding of massive federal deficits will exacerbate the liquidity squeeze – supply declines, demand increases, interest rates rise, and growth in the supply of money and credit decelerates to a level lower than growth in nominal GDP (this is already the case).

Why does this matter? Charles Gave, in "Why A Curve Inversion Matters," provides an explanation.[4] The yield curve Gave focuses on is not the Treasury curve – "*the government can always borrow*." The relevant yield curve is the one that governs private sector borrowing. Gave's short-term rate is the prime lending rate charged by U.S. banks and the long-term rate is a long-dated, seasoned industrial bond rated Baa by Moody's. When the short-term rate exceeds the long-term rate, the economy has always experienced a recession within one year, or "… *a financial accident has afflicted economies which run fixed currency links with the US dollar*." Currently, the spread between these two rates is zero. That means we are on the cusp. The prime

[3] Booth, Danielle DiMartino. "The Great Contagion," blog post, May 2, 2018. (This blog post is a summary of much more extensive analysis by Booth which is available on a proprietary basis.)
[4] Gave, Charles. "Why A Curve Inverstion Matters," The Daily, GavekalResearch, May 1, 2018.

lending rate will rise in lock step with the federal funds rate in coming months. Long-term rates have also been rising. But, as liquidity diminishes, the likelihood of yield curve inversion will rise.

Gave's leading indicator of recession has never been wrong. The reason is straight forward. The long-term rate is a measure of return on capital. This rate mirrors nominal growth in GDP and corporate profits. The short-term rate is indicative of the cost of capital. When the cost of capital rises above the long-term return, firms will find it unprofitable to borrow. Gave paints a grim picture of what follows – financial engineering unravels, zombie companies will fail, capital spending will be reduced, workers will be laid off and the economy will move into recession.

So, enjoy the good times that seem likely to prevail during 2018 and perhaps 2019, but in the interests of prudent risk management, prepare for the possibility of recession in 2020 or possibly 2019.

As is always the case, the future trajectory of the economy could change in ways that short-circuit the current good times or extend them. The benign outcome would be one in which the fiscal stimulus prompts an investment boom which increases productivity and lifts the potential rate of growth substantially. This would reduce inflationary pressures and generate more tax revenues, which would make the burgeoning federal public debt more manageable.

But, developments could follow a different less sanguine path, perhaps one in which inflation rises more rapidly than expected, inflation expectations become unanchored, and interest rates soar, prompting an even tighter monetary policy which brings a quick and premature end to the good times. The steady escalation worldwide in debt leverage, much of which is denominated in dollars, has weakened the resiliency of the global financial system to weather shocks.

II. Will Productivity Rise in Coming Quarters and Boost Potential Real GDP Growth?

One of the driving narratives linked to passage of the Tax Cuts and Jobs Act was that tax reform would raise potential real GDP growth substantially. It would accomplish this by stimulating investment, which in turn would increase jobs and raise productivity. The effect would be to raise both employment and wage rates, which in combination would increase aggregate economic activity and aggregate income. This outcome, in turn, would raise tax revenues sufficient to pay for the tax cuts.

Alan D. Vivard, in an American Enterprise Institute blog post, summed it up this way: "*The rate reduction will prompt self-interested corporations to make additional*

investments to obtain larger tax savings from the rate reduction. The additional investment will make workers more productive and therefore more valuable to employers. Competition by employers to hire additional workers will force employers to pay higher wages. The additional investment and the increases in productivity and wages will occur over several years."[5]

Few economists have bought into this rosy scenario. For example, the nonpartisan Congressional Budget Office, **CBO**, projects that only about one-third of the $1.5 trillion in lost tax revenues will be recovered through higher growth over the next ten years. In fact, most economists have not changed their estimates of long-term potential real GDP growth, which remain clustered in a range of 1.7 percent to 2.0 percent.

This naturally raises the question of why most economists don't buy into the tax reform narrative. The answer lies in understanding what drives potential real GDP growth and whether and to what extent those drivers can be changed by policy actions.

There are two ways to increase potential real GDP growth – growth in total hours worked and productivity.

1. <u>Potential Real GDP – Total Hours Worked</u>

In recent years, growth in total hours worked has been slowing for several reasons – declining fertility (lower birth rates per woman of child-bearing age), decreasing immigration, falling labor force participation due to an aging population, and decline in prime-age male participation because of the opioid epidemic, high prison incarceration rates, delay in entering the labor force because of pursuing higher education opportunities, and other reasons. The average length of the work week has been relatively stable and, thus, has not contributed to the decline in growth in total hours worked.

Reversing the adverse trend in fertility and aging demographics probably has limited potential. Fertility in the U.S. has declined steadily since 2008 and shows no signs of stabilizing or reversing. Immigration policies could boost growth, but current politics are pushing strongly in the opposite direction. Arguably, focused policies could boost labor force participation rates. For example, government policies could support educating and preparing young people and retraining older workers for emerging jobs. There are many other ideas for boosting participation but policy proposals have

[5] Vivard, Alan D. "Economic Effects of the Corporate Tax Rate Reduction," American Enterprise Institute, March 6,2018.

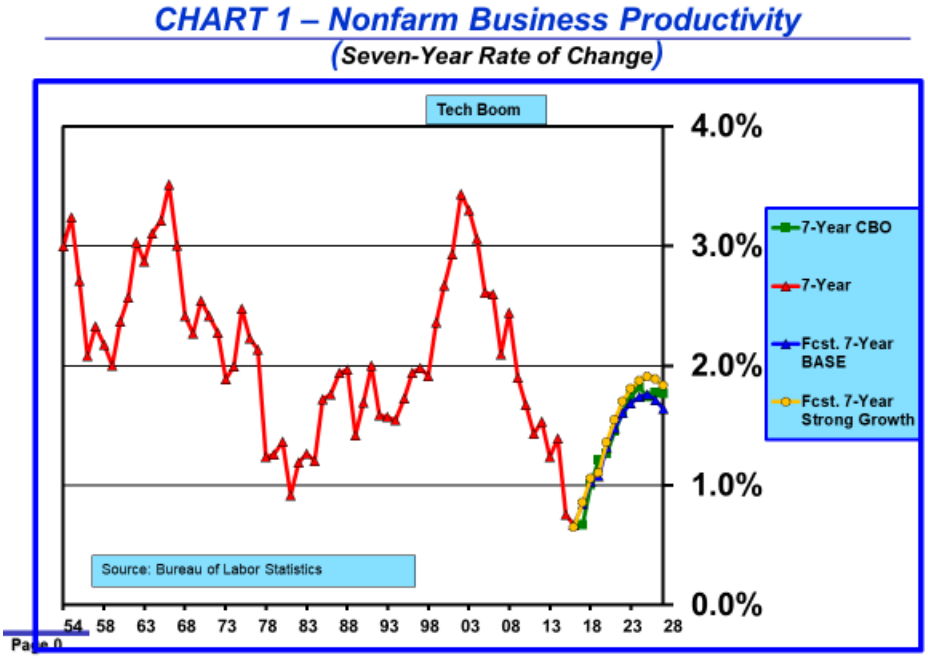
met with little political traction, such as figuring out how to reverse the job killing consequences of the opioid epidemic.

Thus, a meaningful increase in growth in total hours worked seems unlikely, with risks tilted to the downside.

Putting all of this together, **CBO** expects growth in total hours worked to average 0.31 percent annually between 2023 and 2028.

2. Potential Real GDP – Nonfarm Business Productivity

As can be seen in **Chart 1**, in recent years, nonfarm business productivity has been very depressed by historical standards. **Chart 1** shows historical rates of increase in productivity and **CBO's** projections and those for my "**BASE**" and "**STRONG GROWTH**" scenarios from 2018 through 2028. To give a better sense of the evolving trend in productivity, the seven-year moving average is shown in **Chart 1**.



Since 1954 productivity has averaged 2.1 percent annually. During this 64 years, there have been two periods when productivity greatly exceeded 2.1. The first lasted from 1954 to 1973 when productivity increased 2.71 percent annually. Factors propelling high productivity during these 20 years included massive improvements in transportation, such as the interstate highway system, and extremely high investment spending on plant and equipment which enabled substantial capital deepening. But, then, as baby boomers began to enter the labor force, productivity slowed and averaged only 1.46 percent over the next 24 years until 1997. The

second period of high productivity lasted only seven years from 1997 to 2004. Productivity averaged 3.39 percent. This short period encompassed the coming of age of the internet and large investments in communications technology.

However, following the end of the technology boom in 2004, productivity has averaged only 1.26 percent annually, even lower than the dismal record of 1973 to 1997. And, as can be seen in **Chart 1**, the seven-year moving average declined steadily throughout this period, falling to 0.67 percent at the end of 2017 before rising marginally to 0.82 percent in the first quarter of 2018.

At least part of the decline in productivity over the past 14 years has been the depressing cyclical impact of substantial slack in the labor and output markets. With labor abundant and cheap, businesses had little incentive until recently to invest. Now that the economy has returned to full employment, productivity should improve.

What is important to the outlook for the rate of growth in potential real GDP is just how much nonfarm business productivity will increase in coming years. Most analysts expect productivity will rise but will not reach the long-term historical average of 2.1 percent. For example, **CBO** expects nonfarm business productivity growth will rise well above its recent sub-one percent level and average 1.79 percent between 2023 and 2028. Combining **CBO's** forecasts of total hours worked and productivity results in annual potential real GDP growth of 1.82 percent. (Note: economy-wide productivity is less than nonfarm business productivity.)

CBO's projections of nonfarm business productivity from 2018 through 2028 are shown in **Chart 1** and **Table 1**. **Chart 1** and **Table 1** also include my forecasts for productivity for my "**BASE**" and "**STRONG GROWTH**" scenarios. In my "**BASE**" scenario, I assume during 2023-2028 that growth averages 0.45 percent for total hours worked, 1.63 percent for nonfarm business productivity, and 1.88 percent for potential real GDP. In my "**STRONG GROWTH**" scenario, I assume during 2023-2028 that growth averages 0.52 percent for total hours worked, 1.82 percent for nonfarm business productivity, and 2.05 percent for potential real GDP.

Growth in nonfarm business productivity in a range of 1.6 to 1.8 percent in coming years would exceed the 1.46 percent average from 1973 to 1997 and the 1.26 percent average of 2004 to 2018. However, this level of productivity, which is far from certain, would be sufficient only to guarantee potential real GDP growth of 1.7 to 2.0 percent, which is nowhere close to the 3.0 percent growth embedded in the upbeat narrative touting the benefits of tax cuts for economic growth.

Table 1

Nonfarm Productivity Projections: 2018-2028
(percentages)

	BASE	Strong Growth	GS	B of A	CBO
2017	1.31	1.31	1.31	1.31	1.31
2018	1.19	1.22	1.50	1.19	1.89
2019	1.35	1.50	1.50	1.14	1.86
2020	1.69	1.69	1.50		1.83
2021	2.00	2.03	1.50		1.68
2022	1.86	2.04	1.50		1.71
2023	1.76	1.96	1.50		1.80
2024	1.77	1.96	1.50		1.76
2025	1.65	1.83	1.50		1.82
2026	1.56	1.74	1.50		1.77
2027	1.52	1.72	1.50		1.81
2028	1.51	1.72	1.50		1.76
2018-2022	1.62	1.70	1.50		1.79
2023-2028	1.63	1.82	1.50		1.79
2018-2028	1.63	1.77	1.50		1.79

To understand just how much of a stretch the 3.0 percent growth claim is, what would nonfarm business productivity have to be, it one assumes my optimistic assumption of 0.52 percent annual growth in total hours worked, compared to **CBO's** assumption of 0.31 percent? The answer is approximately 2.88 percent (or 3.11 percent, substituting **CBO's** 0.31 percent assumed growth in total hours worked), more than a full percentage point above **CBO's** projection and nearly a percentage point above the 64-year average. Is this possible? Perhaps, if we experience a burst in productivity growth such as occurred from 1997 to 2004. But, there is ample reason for skepticism. Indeed, it not even a sure thing that nonfarm business productivity will rise to a range of 1.6 to 1.8 percent. It could be lower. **GS** assumes 1.5 percent. What if productivity continues to average 1.26 percent as it has since 2004?

3. Reasons for Collapse of Nonfarm Business Productivity Growth from 2004 to 2018

Examining why productivity plummeted in recent years, may shed some insight into the prospects for acceleration in productivity growth in coming years.

Some argue that the decline in productivity growth was been caused primarily by the severity of the Great Financial Crisis and slow recovery, which led to an extended

period during which supply greatly exceeded demand and labor was abundant and cheap. Pursuing this line of argument, productivity should recover now that slack no longer prevails between potential and actual output and the labor market is extremely tight. Demand now exceeds supply and this should prompt businesses to invest to increase productive capacity and substitute capital for labor.

Another line of argument, thoroughly articulated by Northwestern University economist Robert Gordon in "*The Rise and Fall of American Growth*" and "*Why Has Economic Growth Slowed When Innovation Appears to be Accelerating,"* is that the impact of recent technological innovation has had a limited impact on productivity. This is not a cyclical phenomenon. Most find Gordon's analysis hard to accept because of their intuitive reaction to the explosion of 3-D printing, biotechnology, nanotechnology, quantum computing, advances in materials science, smart phones, energy storage and software applications over the past ten years. Gordon's response is dismissive: "*Progress thus far suggests that the impact on productivity growth and job destruction will be gradual and evolutionary, not sudden and revolutionary."*[6]

Some argue that the slowdown in productivity growth has been the consequence of overly burdensome government regulations. Still others suggest that exploding fiscal deficits could crowd out private investment, thus nullifying one of the principal policy intentions of the Tax Cuts and Jobs Act. Yet another inhibiting factor is the potential for more restrictive trade policies.

B of A examined some of these factors and offered several observations.[7] First, the negative impact on potential growth of increased restrictions on immigration could outweigh any benefits of tax reform on work incentives. Second, crowding out of private investment from big budget deficits could more than offset the stimulus from lower corporate tax rates. Third, uncertainty and protectionism could more than offset the benefits of reduced regulation. Based on its analysis, **B of A** found no reason to alter its 1.7 percent long-term potential real GDP growth assumption.

Others fault monetary policy which has depressed rates of return and encouraged financial engineering in lieu of investment in productive activity. Charles Gave blames poor productivity on low real rates of interest and asserts that cheap money destroys growth.[8] The general argument is that capital is diverted to low-risk speculative assets because leverage is cheap and interest rates are controlled

[6] Pethouskoukis, James. "The Rise and Fall (and Rise?) of American Growth," American Enterprise Institute, May 1, 2018.
[7] Harris, Ethan. "Are US Policies Raising or Lowering Potential Growth?" US Economic Viewpoint, B of A Merrill Lynch, May 9, 2018.
[8] Charles Gave. "E Pur Si Muove, GavekalResearch, The Daily April 7, 2017.

rather than financing more risky investments in productive activities. Unambiguously, over long periods of time, low real rates and low productivity are positively correlated. However, the question is whether low rates are the cause of low productivity or rather whether low productivity caused by other forces is the cause of low rates of interest.

I tested Gave's hypothesis and found a sustained decline in long-term real interest rates of 100 basis points reduces productivity by about 20 basis points and potential real GDP growth by a little more.

Persistent low productivity gains in recent years are not unique to the U.S. It is a shared phenomenon affecting all developed economies. While it is tempting to blame this development on consequences of the Great Recession, arguments have been made that the weakness in productivity is not transitory but rather reflects a secular slowdown in innovation and capital investment. But Gave's view, which appears to be supported by my econometric analysis, would assign some of the responsibility for lower productivity to central banks' use of monetary policy to depress nominal and real rates of interest.

Some, such as **GS**, argue that productivity is underreported because technological change is mismeasured by the Bureau of Labor Statistics. **GS** estimates that mismeasurement results in productivity being underreported by 0.25 to 0.50 percent. Other analysts, while acknowledging that productivity is hard to measure and is probably misstated, argue that there is no evidence that measurement error has been materially greater in recent years. They do not find **GS's** arguments persuasive.

According to a recent Bloomberg release, statisticians at the Bureau of Labor Statistics and the Bureau of Economic Analysis have been studying the issue of potential mismeasurement of quality changes in computer hardware and software on price indices. The Bloomberg report indicates that price indices might be overstated by as much as 40 basis points annually over the period 2000 to 2015. If this is so, then real GDP growth would be understated by the same 40 basis points annually. Measured productivity would also increase as would potential real GDP growth. Along with a higher measured real rate of GDP growth, real interest rates would also be higher.

While this might seem like good news, it would mean that inflation is a lot lower than currently reported and considerably below the **FOMC's** 2.0 percent nominal target. The implication of lower inflation, along with the emerging view that NAIRU is lower than **CBO's** estimate, is that monetary policy should be normalized at a much slower

pace than implied by the **FOMC's** projections to enable "mismeasured" inflation to rise to the policy target of 2.0 percent.

If measurement error is dismissed as explaining part of the decline in productivity, **GS** argues that there are two other cyclically-based effects that explain much of the decrease. The implication is that cyclically-based effects will eventually reverse and productivity will rebound to a much higher and persistent level.

First, **GS** argues that slower growth in capital services per hour worked has had an important negative impact on productivity. This is linked to weakness in capital spending. The cyclical argument is that capital spending will rebound as the economy operates at full capacity over time. I would categorize this as a "hope" argument. Measures of capacity utilization remain are low, even though full employment appears to have been reached. There are countervailing arguments having to do with structural changes in the economy toward less-productivity prone services, diminished innovation, as well as significant declines in housing and government investment.

Second, **GS** examines components of its proprietary current activity indicator(CAI) which historically have been correlated with changes in productivity. It finds that growth in output-related components has accelerated and this development should lead to increased productivity over time. This is a novel analysis and may turn out to have merit, but it is untested; in other words, correlation does not necessarily imply causality.

If productivity weakness continues rather than rebounding, this would depress potential real GDP the range forecasters currently expect. Such an outcome would depress interest rates and growth in wages and would exact downward pressure on inflation.

4. Reasons for Collapse of Nonfarm Business Productivity Growth from 2004 to 2018 – McKinsey Study

The McKinsey Global Institute recently published a comprehensive study: "Solving the Productivity Puzzle: The Role of Demand and the Promise of Digitalization."[9]

In its study, McKinsey identifies three "waves" which explain the recent in productivity. Wave 1 accounted for 1.0 percent decline in productivity and involved the exhaustion the internet, PC, telecommunications boom following 2004. Wave 2 was involved the consequences of the Great Financial Crisis and was responsible for a further 1.0 percent decline. Wave 3 embraces the process of digitizing the

[9] McKinsey Global Institute. "Solving the Productivity Puzzle: The Role of Demand and the Promise of Digitalization," February 2018.

economy, which McKinsey describes as "*involving a transformation of operating and business models*," which is currently underway. McKinsey believes that wave 3 "… *promises significant productivity-boosting opportunities but the benefits have not yet materialized at scale, [*which*] is due to adoption barriers and lag effects as well as transition costs.*"

McKinsey concludes with an upbeat forecast that productivity is set to recover and should average 2.0 percent over the next ten years, with 60 percent of growth coming from digital opportunities.

5. Productivity Prospects

As is often the case in economics, there are many views about the future course of productivity and an absence of consensus. However, I think one can tease out a probable range of 1.5 percent to 2.0 percent. The lower end of the range would be consistent with a "normal" cyclical recovery in productivity and Robert Gordon's pessimistic view about the prospective benefits of technological innovation. A downside risk to the lower end of the range is Charles Gave's argument about the negative impact of monetary policy and a permanently lower real rate of interest. The upper end of the range incorporates both a cyclical recovery and McKinsey's more optimistic view of the emerging benefits of digitalization of business processes.

Future productivity assumptions in **CBO's** and my scenarios fall in the middle of the 1.5 percent to 2.0 percent range, which, in turn support expected potential real GDP growth in a range of 1.7 percent to 2.0 percent. If McKinsey's optimism about 2.0 percent productivity prevails and growth in total hours works averages a robust 0.5 percent annually, then there is an upside possibility that potential real GDP growth could reach 2.25 percent. So, the 3.0 percent potential real GDP growth narrative appears far-fetched and unrealistic. Thus, the tax cuts and spending increases are highly unlikely to pay for themselves and a sizable and increasingly problematic increase in the total-public-debt-to-GDP ratio appears highly likely.

III. Components of U.S. Real GDP

First quarter real GDP growth was 2.3 percent, disappointingly weak after fourth quarter growth of 2.9 percent. The principal culprit was weak consumer spending. However, this development appears to have more to do with quarterly statistical noise than a harbinger of an emerging weakening trend in economic growth. This interpretation is reinforced by the delay in tax refunds and the fact that tax cuts had not yet begun to show up in paychecks in a significant way. The market not only took the report in stride, it was pleased that reported growth exceed the consensus forecast. Optimism was not dented and attention remains focused on the expected positive impact of substantial fiscal stimulus on economic activity in coming quarters.

Optimists continue to hold sway and favorable economic momentum appears sufficient to guarantee good economic performance for several more quarters. However, there are a few pessimists beginning to surface who are expressing concerns about overheating, upside pressure on inflation and the potential for tighter monetary policy and higher interest rates. While good times appear to be assured for the next 18 to 24 months because of substantial fiscal stimulus, worries are surfacing about what happens after that. Will growth slow gradually and dampen overheating – the proverbial soft landing? Or, will we face a classic end-of-cycle overshoot that will inevitably lead to recession?

1. "Advance Estimate" of First Quarter GDP

The "**Advance Estimate**" of first quarter GDP growth was 2.3 percent. Details are shown in **Table 2.** The bottom four panels of **Table 2** show different measures of real GDP growth. These include the traditional "**Total GDP**" measure, and three alternatives – "**Final Sales**," "**Private**," and "**Private Domestic**."

Reported quarterly "**Total GDP**" growth tends to be highly variable because of volatility in various GDP components, especially inventories, and the methodology of annualizing quarterly growth rates which amplifies the impact of short-term aberrations in the growth of individual GDP components. "**Total GDP**" grew 2.32 percent in the first quarter "**Advance Estimate,**" the slowest rate since the first quarter of 2017. Weak first quarter growth has been a recurring phenomenon in recent years, suggesting perhaps a downward bias in first quarter seasonal adjustment factors.

Table 2
Composition of 2018 and 2017 Quarterly GDP Growth

	First Quarter 2018 Advance Estimate	First Quarter 2018 Preliminary Estimate	First Quarter 2018 Final Estimate	Fourth Quarter 2017	Third Quarter 2017	Second Quarter 2017	First Quarter 2017
Personal Consumption	.73%			2.75%	1.49%	2.24%	1.32%
Private Investment							
Nonresidential	.76%			.84%	.58%	.82%	.86%
Residential	.00%			.46%	-.18%	-.30%	.41%
Inventories	.43%			-.53%	.79%	.12%	-1.46%
Net Exports	.20%			-1.16%	.36%	.21%	.22%
Government	.20%			.51%	.12%	-.03%	-.11%
Total	**2.32%**			**2.87%**	**3.16%**	**3.06%**	**1.24%**
Final Sales	**1.89%**			**3.40%**	**2.37%**	**2.94%**	**2.70%**
Private	**1.69%**			**2.89%**	**2.25%**	**2.97%**	**2.81%**
Private Domestic	**1.49%**			**4.05%**	**1.89%**	**2.76%**	**2.59%**

Growth in "**Total GDP**" tends to be volatile from quarter to quarter, which makes this measure an unreliable indicator of economic strength. Alternative GDP measures strip away the noisier quarterly components and often provide a better sense of economic strength. The "**Final Sales**" measure of real GDP removes the contribution of changes in inventories, which is very volatile from quarter to quarter. "**Final Sales**" grew 1.89 percent in the fourth quarter, which was much weaker than the 3.40 percent growth rate in the fourth quarter.

"**Private**" GDP omits both inventory changes and government investment spending. Growth in government expenditures typically rises during periods of economic weakness or when Congress increases spending, such as is currently the case, and falls during periods of economic strength or when fiscal austerity is the order of the day.

In my opinion, "**Private Domestic**" GDP is the best quarterly measure of fundamental economic momentum. It omits inventory changes, government spending and net exports. This measure gives the truest picture of the performance of the core of the U.S. economy, which accounts for approximately 87 percent to "**Total GDP**." Annualized quarterly growth rates of this measure are generally, but not always, less volatile.

But, while the four alternative measures of real GDP growth provide some context to the factors driving growth, the annualization of quarterly data amplifies statistical errors and timing anomalies, which makes it difficult to discern underlying trends.

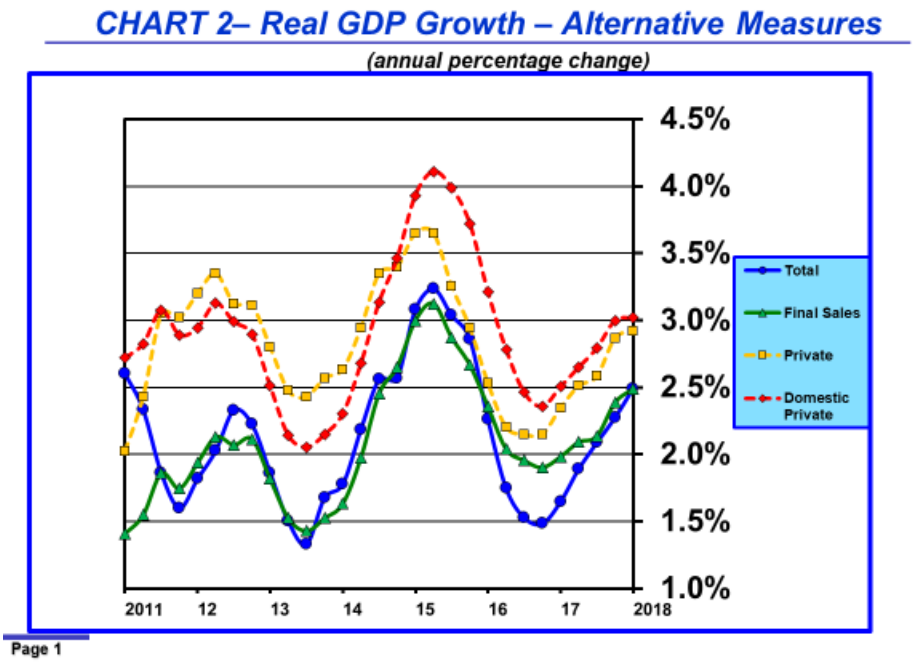
2. Growth Rates of Real GDP Components – 4-Quarter Moving Average

Thus, quarterly data is often misleading about the underlying trends in economic growth. **Table 3** and **Chart 2** show four-quarter moving averages of growth rates for GDP components as well as the four alternative measures of real GDP. This smooths out quarterly aberrations in the data and gives a clearer picture of the health and direction of the economy.

Growth in "**Private Domestic**" GDP has been consistently greater than growth in "**Total GDP**" for several years. This has also been the case for "**Private**" GDP since the second quarter of 2011. Since the fourth quarter of 2014, growth in "**Domestic Private**" GDP has been stronger than growth in "**Private**" GDP. This means that trade has had an unfavorable impact on GDP growth over the past three years.

Table 3
Year-Over-Year Growth Rates for Components of Real GDP

	GDP Com-ponent Weight	First Quarter 2018	Fourth Quarter 2017	Third Quarter 2017	Second Quarter 2017	First Quarter 2017	Fourth Quarter 2016	Third Quarter 2016
Personal Consumption	69.51%	2.69%	2.75%	2.75%	2.80%	2.81%	2.73%	2.78%
Private Investment	17.39%							
Nonresidential	13.64%	5.34%	4.69%	3.28%	1.94%	.57%	-.59%	-.67%
Residential	3.47%	1.24%	1.77%	1.76%	2.09%	3.34%	5.48%	7.41%
Inventories	.13%	-1.49%	-54.5%	-21.9%	-59.8%	-69.7%	-66.8%	-66.3%
Net Exports	-3.65%	5.37%	6.06%	7.83%	5.98%	6.33%	7.51%	10.59%
Exports	12.86%	3.69%	3.36%	2.27%	1.97%	.76%	-.33%	-.93%
Imports	-16.51%	4.06%	3.95%	3.45%	2.83%	1.92%	1.27%	1.32%
Government	16.91%	.45%	.11%	.03%	.13%	.28%	0.75%	1.05%
Total	**100.0%**	**2.49%**	**2.27%**	**2.09%**	**1.89%**	**1.65%**	**1.49%**	**1.53%**
Final Sales	**99.87%**	**2.49%**	**2.39%**	**2.14%**	**2.09%**	**1.98%**	**1.90%**	**1.96%**
Private	**82.95%**	**2.92%**	**2.87%**	**2.58%**	**2.51%**	**2.35%**	**2.15%**	**2.15%**
Private Domestic	**86.60%**	**3.02%**	**3.00%**	**2.79%**	**2.65%**	**2.50%**	**2.36%**	**2.46%**



Since 2015 fiscal policy has been mildly supportive of "**Total GDP**" growth. In recent quarters government's contribution to real GDP growth has been small, which has reduced the growth rate in "**Total GDP**" relative to "**Private**" GDP. Government spending boosted "Total GDP" growth by 20 basis points in the first quarter and

government's contribution should increase further in 2018 and 2019 as federal spending (not including transfer payments which are not counted in the government sector of GDP) ramps up.

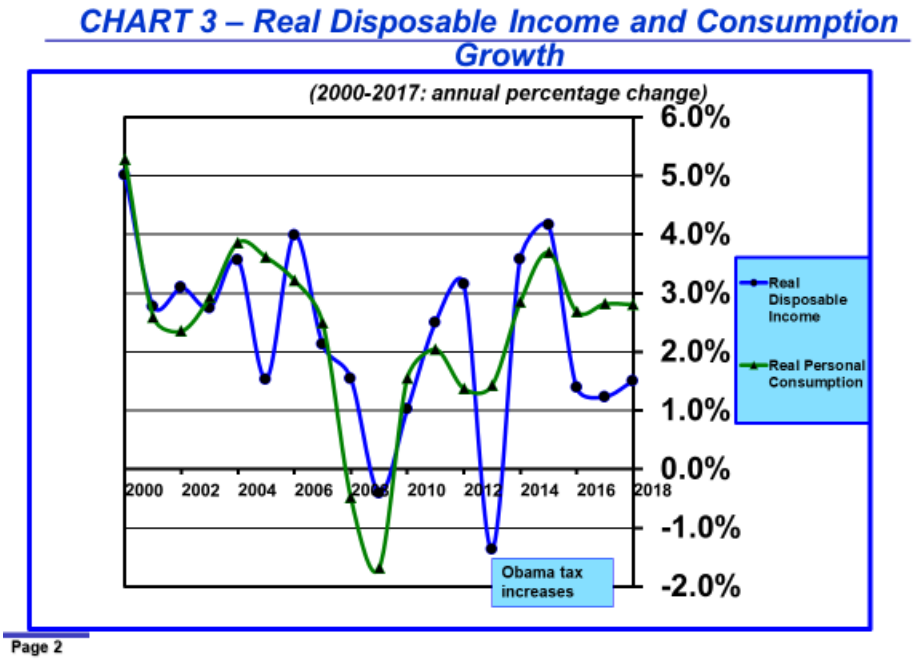
There are some important takeaways from **Chart 2.** First, all four measures of real GDP growth troughed in the fourth quarter of 2016 and have risen gradually since then, reflecting accelerating growth momentum. Second, "**Private**" GDP, which omits government spending and inventory accumulation, and "**Private Domestic**" GDP, which omits government spending, inventory accumulation and net exports, have been growing more rapidly than "**Total GDP**" and "**Final Sales.**"

3. Consumption and Disposable Income

Personal consumption contributed 0.73 percent to first quarter real GDP growth compared to 2.75 percent in the fourth quarter. However, the four-quarter trend in consumer spending edged down only slightly from 2.75 percent to 2.69 percent, which underscores the limitations of relying on annualized quarterly data to discern trends.

In the long run, growth in nominal disposable income and consumer saving preferences determine growth in nominal personal consumption. Growth in nominal disposable income, in turn, depends upon a lot of things but the most important ones are growth in employment and wage rates. Tepid growth in employment and lethargic growth in wage rates will result in slow growth in disposable income. In recent months employment growth has been quite strong, but wage growth has been lackluster.

Chart 3 shows annual rates of growth in real disposable income and real consumer spending from 2000 through the first quarter of 2018. The negative impact of the Great Recession on both disposable income and consumption growth is clear in **Chart 3**. So, too, is the temporary depressing effect of the Obama tax increases on disposable income growth in 2012 but not on consumption growth. However, it is unclear why growth in disposable income faltered in 2016 and 2017 while consumption growth remained relatively strong.



As is evident in **Chart 4**, disposable income growth rose in the fourth quarter to 1.94 percent and further in the first quarter to 3.16 percent. This improving trend will continue in 2018 and will benefit from strong gains in employment, rising wage rates and tax cuts and should close the gap between growth in disposable income and consumption.

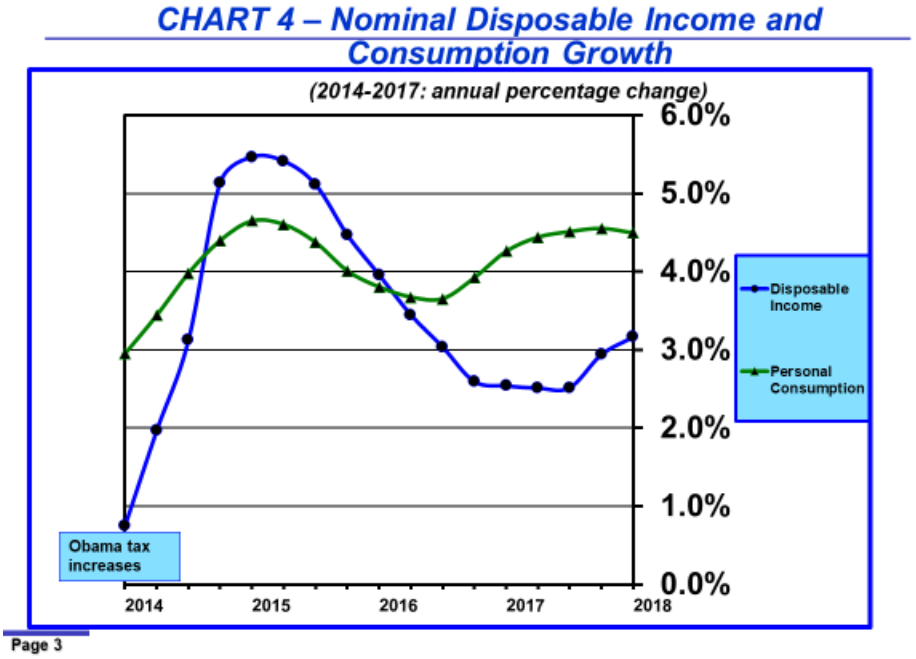
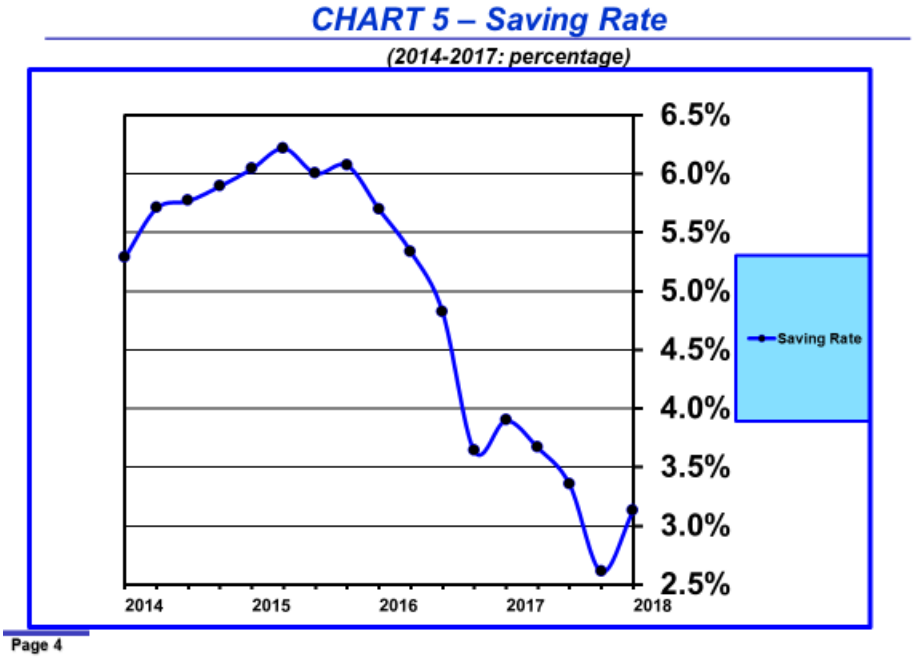


Chart 4 shows the 4-quarter moving average growth rates in nominal disposable income and consumption from 2014 through the first quarter of 2018. Growth in consumption is typically less volatile than growth in disposable income. Consumer saving serves as the buffer (see **Chart 5**). When growth in disposable income is weak, the saving rate declines as consumers dip into savings and increase borrowing to sustain consumption. This phenomenon is consistent with the permanent income hypothesis which posits that consumers will plan consumption expenditures based upon expected long-run sustainable income rather than adjust consumption to short-term oscillations in disposable income.



As is evident in **Chart 5**, so far as the reported data are concerned, consumer spending has been supported by a collapse in the saving rate from 6.1 percent during 2015 to 3.4 percent in 2017. Continuing the downward trend, the saving rate in the first quarter of 2018 was 3.1 percent.

Since the election of President Trump, consumer and business confidence has surged to the highest levels in 20 years. Over the same time, consumption growth has accelerated but income growth didn't follow suit until the last two quarters. Income growth needs to continue accelerating until it matches consumption growth. If it does not, either the saving rate will continue to fall or growth in spending will slow – neither alternative is desirable. However, tax cuts, relatively strong employment growth in the next few months and acceleration in wage growth are

likely to boost income growth and stabilize the saving rate without depressing spending growth.

However, beyond the next few quarters, the outlook for consumer spending growth is not a happy one. Forecasts of growth in real consumer spending over the next several years are shown in **Table 4** and **Chart 6.** Real consumer spending increased 2.69 percent in 2016 and 2.82 percent in 2017. These are not the final numbers as several more revisions will occur over the next few years.

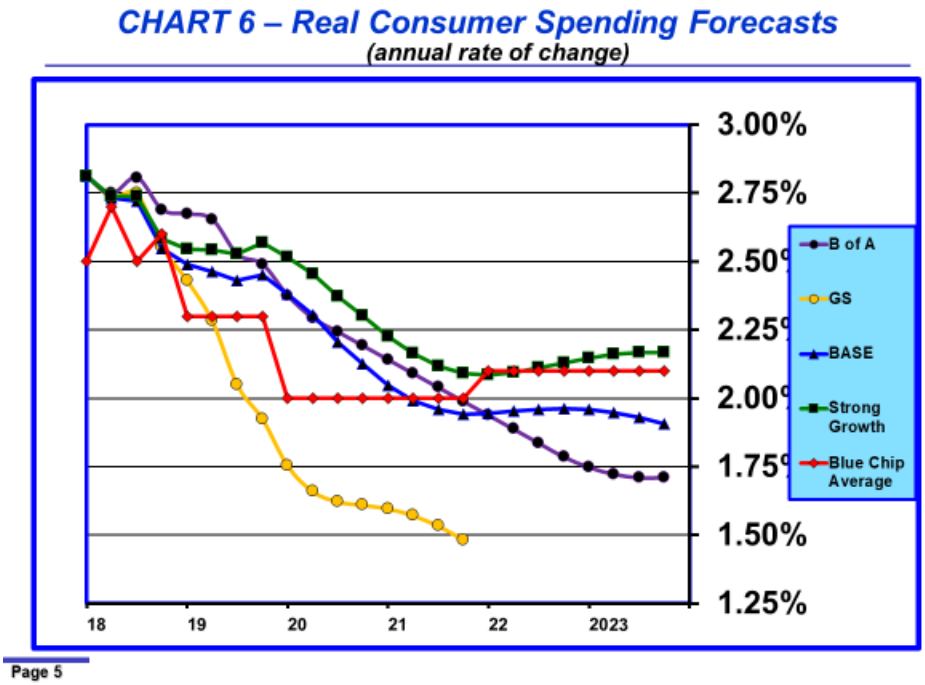
Table 4
Real Personal Consumption Growth Rate Forecasts

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Actual	2.84	3.70	2.69	2.82					
B of A					2.69	2.49	2.19	1.99	1.79
GS					2.56	1.92	1.61	1.48	
ISH Markit					2.90	2.40	2.10	2.10	2.10
Economy.com					2.70	2.50	1.10		
Blue Chip					2.60	2.30	2.00	2.00	2.10
Bill's BASE					**2.55**	**2.45**	**2.13**	**1.94**	**1.96**
Bill's Strong Growth					**2.58**	**2.57**	**2.30**	**2.09**	**2.13**

Most forecasters expect real consumer spending growth to slow in coming years because the economy is at or above full employment and employment growth is set to slow in coming quarters to match the underlying demographic dynamics of aging and slowing population growth. Fiscal stimulus will delay this correction for at least another year and possibly two.

This slowing pattern in consumer spending growth is apparent in the data in **Table 4** and **Chart 6.** Growth in real wages might moderate the forecast decline in consumer spending growth, but only if the growth rate in real wages increases more than most expect. That would require productivity to improve from its recent very low level, which would be a welcome result, but is not at all assured.

All forecasters agree that consumer spending growth will slow. From 2018 to 2021 my "**BASE**" scenario forecast differs little from most others. In 2022 and 2023 my forecasts are a little higher than **B of A's** but a little lower than the **Blue Chip** average. **GS** is clearly much more pessimistic beginning in 2019. **GS's** below consensus forecast of consumer spending growth is consistent with its below consensus projection of real GDP growth.



4. Business Investment

Real private investment consists of three principal categories – business investment, which is labeled “nonresidential” 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 the growth rate in inventories closely tracks growth in business and residential investment.

Table 5 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.

Nonresidential investment (business) growth was crushed in 2016 by the collapse in oil and commodity prices. But business investment was down in other sectors as well. Investment growth was negative -0.59 percent in 2016.

Nonresidential investment came out of deep slumber in 2017, rising at an annual rate of 4.69 percent. A recovery in energy investment accounted for much of this surge. Capital investment growth in sectors other than energy and oil has improved slightly but only to about the underlying long-term trend rate of 2.66 percent. Considering the acceleration in global growth and the tightening U.S. labor market, the improvement in growth in investment spending so far has been underwhelming.

However, this is expected to change in 2018 and 2019 due to tax breaks contained in the Tax Cuts and Jobs Act, which are intended to stimulate investment

Table 5

Real Private Investment (Residential and Nonresidential) Growth Rate Forecasts

	2015	2016	2017	2018	2019	2020	2021	2022	Ave. 1947-2018
REAL PRIVATE INVESTMENT									
Actual	3.83	0.63	4.08						**3.76****
B of A				5.33	4.97	4.05	3.60	3.19	
GS				4.78	3.32	2.73	2.70		
Bill's BASE				**5.17**	**4.70**	**2.20**	**0.86**	**1.41**	
Bill's Strong Growth				**5.56**	**5.20**	**2.33**	**1.26**	**1.87**	
REAL NONRESIDENTIAL (BUSINESS) INVESTMENT									
Actual	2.34	-0.59	4.69						**2.66***
B of A				6.05	5.42	4.29	3.74	3.22	
GS				5.25	3.47	2.97	2.80		
REAL RESIDENTIAL INVESTMENT									
Actual	10.23	5.48	1.77						**-0.15***
B of A				2.53	3.16	3.07	3.03	3.03	
GS				2.98	2.70	1.76	2.30		

*Average 1999-2018

**Real private investment = 1.79% for 1999-2018

First quarter business investment grew at an annualized rate of 4.6 percent, which tracks closely to the full year forecasts of **GS** and **B of A**.

Forecasters expect **real private investment** growth will be well above the average of the last 20 years in 2018, 2019 and 2020. Strong growth is supported by **GS's** capital expenditures tracker, which has risen strongly in recent months and registered an above trend level of approximately 9.0 percent in April. **GS** expects easier financial conditions and stronger domestic demand, as implied by purchasing manager surveys, to make 2018 a very good year. With the passage of tax reform, as the **GS** capital expenditures tracker is signaling, risks are now tilted in the direction of strong business investment growth in 2018 and 2019.

Generally, in recent years, analyst forecasts of growth in business investment have been too optimistic and this may again prove to be the case with **B of A's** and **GS's** above trend capital spending forecasts for 2018 and particularly for **B of A's**

continued above trend forecasts in 2019, 2020 and 2021. However, several features of tax reform are intended to boost business investment, so the optimistic forecasts might come to pass this time and perhaps even be exceeded in 2018.

Following 2018 and over the next several years **GS** expects **business investment** to slow gradually to the long-term trend growth of 2.66 percent that has prevailed over the last 20 years, while **B of A** expects growth to be above trend for 2018-2022.

B of A and **GS** are optimistic about the outlook for business investment growth to remain at a high level over the next several years because they expect corporate profits to accelerate, credit conditions to remain benign and uncertainty to diminish. The benefits of tax reform must now be added to those positive drivers. A potential weakness in **B of A's** business investment model is the possibility of cumulative negative effects over time of low interest rates and depressed innovation, as reflected in a slower rate of new business formation. (Note that the "Tax Cuts and Jobs" Act could lead to acceleration in new business formation, but such an acceleration could be influenced by restructuring to take advantage of tax law rather than to any fundamental acceleration in investment and innovation.) Also, according to the Federal Reserve's data on capacity utilization, because firms are operating at less than full capacity, the incentive to invest is lessened.

Housing – Real residential investment growth has been weak in recent quarters despite lean housing inventories and relatively strong demand. First quarter annualized growth was exactly 0.0 percent, which followed weak growth of 1.77 percent in 2017. This ongoing weakness in housing construction has led to above trend increases in housing prices.

Outsized housing price increases, which are exceeding growth in wages and nominal disposable income, will eventually dampen single-family residential demand and inventories should improve with the consequence that residential investment growth should remain slow. Forecasts generally reflect this scenario, although trend growth is expected to exceed, but only very slightly (**GS** and **B of A**), that of overall real GDP growth over the next three years.

Housing starts are still historically low relative to family formation rates. The long-term trend rate in housing starts should be about 1.4 million based upon growth in household formation and replacement of existing homes. But, starts were 1.21 million in 2017, up 2.8 percent from 1.18 million in 2016.

Over the first four months of 2018 housing starts averaged 1.31 million, which was an increase of 7.6 percent from the first four months of 2017.

B of A expects housing starts will be 1.27 million in 2018 because of lower than expected activity in multifamily housing construction**. GS's** forecast is similar – 1.26 million in 2018.

According to **B of A**, the shortfall in housing starts relative to the level implied by demographics and historical trends in household formation can be traced to high levels of student debt, tighter credit standards, including higher down payment requirements, which many have difficulty meeting, and lifestyle changes among Millennials including delays in marriage and having children. The consequence is that Millennials have much lower homeownership rates, a phenomenon that seems likely to persist. This is depressing single family construction.

On the supply side, the number of homebuilders declined substantially during the Great Recession and has not recovered. Credit standards remain tight for construction loans and this is reducing the extent of speculative building.

In summary, housing demand is depressed relative to demographics and historical trends in household formation and supply is weak. Overall housing inventory is very lean. In response, average housing prices have been rising faster than growth in nominal incomes. All else equal, this creates a feedback loop which depresses demand. Ordinarily, this would be offset by increased construction. But in the wake of the Great Recession's cataclysmic impact on builders and lenders, increased construction activity has been constrained.

Housing prices continue to move higher and were up 6.5 percent (S&P CoreLogic Case-Shiller National Home Price Index) in February over the prior year; the Federal Housing Finance Agency's purchase only housing price index was up 6.7% in the fourth quarter of 2017 compared to the fourth quarter of 2016. These increases are well above the 3.2 percent growth in aggregate nominal disposable income and 2.5 percent growth in per capita nominal disposable income over the past 12 months. This differential is eroding affordability and, thus, is not sustainable over the long run. Any increase in mortgage rates will simply make matters worse.

In summary, residential investment growth, which rose only 1.8 percent in 2017, will continue to be weak in coming quarters because of continuing tight credit standards, higher housing prices and the potential for somewhat higher mortgage interest rates. Both **B of A's** 2.5 percent and **GS's** 3.0 percent modest forecasts of housing investment growth in 2018 seem reasonable under the circumstances.

5. Change in Inventories

Inventories added 0.43 percent to "**Total GDP**" growth in the first quarter, subtracted 0.53 in the fourth quarter, added 0.79 percent in the third quarter, subtracted 1.46

percent in the first quarter of 2017 and added 1.06 percent in the fourth quarter of 2016 (see **Table 2**). The change in inventories was very subdued in the second quarter of 2017, adding only 0.12 percent to real GDP. Quarterly changes in inventories are very volatile and that skews interpretation of quarterly "**Total GDP**" data. However, the four-quarter moving average eliminates these quarterly oscillations and indicates that inventory accumulation has added about 0.20 percent to real "**Total GDP**" growth over the last four quarters.

Inventories generally add between 0.1 and 0.2 percent to annual real GDP growth. The recent four-quarter average is at the top end of the historical range. Accumulation in the first quarter was $33.1 billion, which was very close to the long-term trend level of $37.4 billion.

As can be seen in **Table 6,** initial inventory data are rough estimates and are subject to substantial revision over the next three years. The $33.1 billion inventory accumulation in the first quarter "**Final Estimate**" will be revised five more times in the next three years.

To add to the data quality problem, quarterly changes are annualized and this can greatly amplify the impact of data errors and contribute to misperceptions about the trend in real GDP growth. Volatile inventory data are especially troublesome in this regard.

There are two ways to gain a better sense of the underlying trend in real GDP growth. One way is to omit highly volatile data, especially data that are subject to substantial subsequent adjustment. That is why many analysts report the growth rate in "**Final Sales**," which omits inventory data, as I do in **Tables 2** and 3**.**

Another method that helps give a better sense of the underlying trend in real GDP growth is to focus on year-over-year growth rates, which are calculated by dividing the average of the most recent four quarters by the average of the preceding four quarters. The result of that calculation methodology can be seen in **Table 2** by comparing the growth rates in "**Total GDP**" and "**Final Sales**." Quarterly data volatility in growth rates largely disappears – the impact of inventories on "**Total GDP**" growth is very small and the growth trends in "**Total GDP**" and "**Final Sales**" are similar.

Table 6
Quarterly Real Inventory Data
(*most recent data are in red*)

	Advance Estimate	Preliminary Estimate	Final Estimate	First Annual Revision	Second Annual Revision	Third Annual Revision
2018 Q1	33.1					
2017 Q4	9.2	8.0	15.6			
2017 Q3	35.8	39.0	38.5			
2017 Q2	-.3	1.8	5.5			
2017 Q1	10.3	4.3	2.6	1.2		
2016 Q4	48.7	46.2	49.6	63.1		
2016 Q3	12.6	7.6	7.1	17.0		
2016 Q2	-8.1	-12.4	-9.5	12.2		
2016 Q1	60.9	69.6	68.3	40.7	40.6	
2015 Q4	68.6	81.7	78.3	56.9	68.2	
2015 Q3	56.8	90.2	85.5	70.9	96.2	
2015 Q2	110.0	121.1	113.5	93.8	105.6	
2015 Q1	110.3	95.0	99.5	112.8	114.4	132.2
2014 Q4	113.1	88.4	80.0	78.2	76.9	76.9
2014 Q3	62.8	79.1	82.2	79.9	66.8	85.6
2014 Q2	93.4	83.9	84.8	77.1	55.2	69.9
2014 Q1	87.4	49.0	45.9	35.2	36.9	38.7
2013 Q4	127.2	117.4	111.7	81.8	87.2	103.6
2013 Q3	86.0	116.5	115.7	95.6	93.6	109.0
2013 Q2	56.7	62.6	56.6	43.4	39.6	52.6

6. Government Investment

Government investment added a barely discernible 0 .11 percent to real GDP growth in 2017 (see **Tables 2** and **7**). Federal government spending rose at an annual rate of 0.16 percent and state and local spending rose 0.08 percent.

Annualized first quarter 2018 government spending growth was a little stronger 0.20 percent. That means there is a lot of catch up required in the remaining three quarters of 2018 to reach **GS's** forecast of 2.0 percent growth and **B of A's** 1.9 percent forecast. Both expect federal government spending to be very strong in the remainder of the year.

Table 7 shows recent growth rates in government spending and forecasts for 2018-2022. **GS** and **B of A** expect strong growth in government investment spending in 2018 and 2019. The substantial increase in growth is due almost entirely to federal spending. Given customary delays in actual federal spending, I am a bit more

cautious and expect growth to be 1.5 percent in 2018 and then slow after 2019, but not to as great an extent as **GS** is forecasting. It appears that my estimate of 1.6 percent growth in 2019 might be too conservative.

Table 7

Federal and State and Local Investment Spending Growth Rates

	2015	2016	2017	2018	2019	2020	2021	2022
Federal	-0.08	0.05	0.16					
State and Local	2.31	1.18	0.08					
Total Government	1.39	0.75	0.11					
GS Federal				3.71	7.05	3.69	0.97	
GS State and Local				0.99	0.79	0.12	0.04	
GS Total				2.03	3.24	1.57	0.43	
B of A Total				1.93	2.32			
BASE				1.49	1.63	1.29	1.00	0.88
Strong Employment				1.49	1.63	1.30	1.39	1.41

7. Net Exports

In the "**Advance Estimate**" for the first quarter of 2018 net exports added 0.20 percent to first quarter real GDP (see **Table 2**). The four-quarter moving average in **Table 3** indicates that growth in net exports has been positive over the past few quarters. But, because the volume of imports greatly exceeds the volume of exports, that is, net exports are negative, positive growth in net exports means that net exports are reducing real "**Total GDP**" growth. This can be seen in Table 1 by comparing growth rates in "**Private**" and "**Private Domestic**" real GDP.

Since the end of 2016 the trade deficit in goods and services has risen from 2.67 percent of nominal GDP to 2.98 percent in March 2018. The shares of both imports and exports, which are offsetting components of GDP, have increased over the past 15 months. Exports of goods have increased from 7.85 percent to 8.11 percent of GDP and imports of goods have risen from 11.91 percent to 12.38 percent of GDP.

These trends should continue as long as the dollar remains weak and consumer spending remains robust. Exports will also continue to do well because of the weak dollar and strong global demand. However, the increase in the dollar amount of imports will continue to overwhelm the increase in the dollar amount of exports which will drive the trade deficit higher. Consequently, I expect the trade deficit in goods and service will rise substantially during the remainder of 2018.

Trade trends could be impacted negatively if a serious trade war breaks out. The Trump administration wants to reduce the trade deficit and has proposed tariffs on steel and aluminum imports and threatened to impose tariffs on other imported goods. So far this has been more bark than bite, but the possibility of significant tariffs should not be dismissed. If this were to come to pass, tariffs would reduce imports but through retaliatory tariffs, exports would also shrink. It is not clear that an all-out trade war would reduce the size of the U.S. trade deficit. What it would do, however, is to slow global trade and weigh on global economic activity. It is this potential that has spooked the stock market recently, although the market is oscillating between fear that a trade war will erupt and the hope that rhetoric will not lead to consequential tariffs and substantial decreases in trade.

There is another reason that the trade deficit is likely to rise over the next few quarters. Increases in the federal deficit must be funded by a combination of greater consumer or business saving or by increases in foreign capital inflows. The consumer saving rate is declining and business cash flows customarily are negative in the mature phase of the economic cycle. This leaves only foreign capital inflows to fund increases in the federal deficit. But foreign countries can obtain additional dollars only if the U.S. imports more than it exports. Perhaps you have heard of the phrase “twin deficits.” That term refers to the federal budget deficit and the current accounts deficit, of which the trade deficit is the primary component. While the relationship between the two deficits is not exact, an increase in the size of the federal budget deficit is followed several quarters later by an increase in the trade deficit.

First, Second Quarter and Full-Year 2018 GDP Forecasts

B of A’s current first quarter “**Preliminary**” real GDP forecast is 2.3 percent, unchanged from the “**Advance**” estimate. **B of A’s** second quarter real GDP forecast is 3.4 percent and **GS’s** is 3.4 percent, a strong increase from the first quarter’s seasonally depressed 2.3 percent. For the full year, **B of A** has raised its forecast to 3.0 percent and **GS** expects growth to be a very strong 2.9 percent.

8. Longer-Term Real GDP Forecasts

Chart 7 shows quarterly real GDP growth projections from the first quarter of 2018 to the fourth quarter of 2023. **Table 8** includes annual real GDP growth for 2015-17 and forecasts for 2018 to 2023. Forecasts for 2018 range from 2.7 percent (my “**BASE**” and “**STRONG GROWTH**” scenarios) to 3.0 percent (**CBO’s** forecast). Forecasts for 2019 are more tightly clustered and my “**BASE**” and “**Strong Growth**” forecasts are in the middle of the pack.

All forecasters expect real GDP growth to slow considerably in 2020 after the impact of the massive federal fiscal stimulus wears off. Economy.com is especially pessimistic. Forecasters almost never foresee a recession until it is well underway.

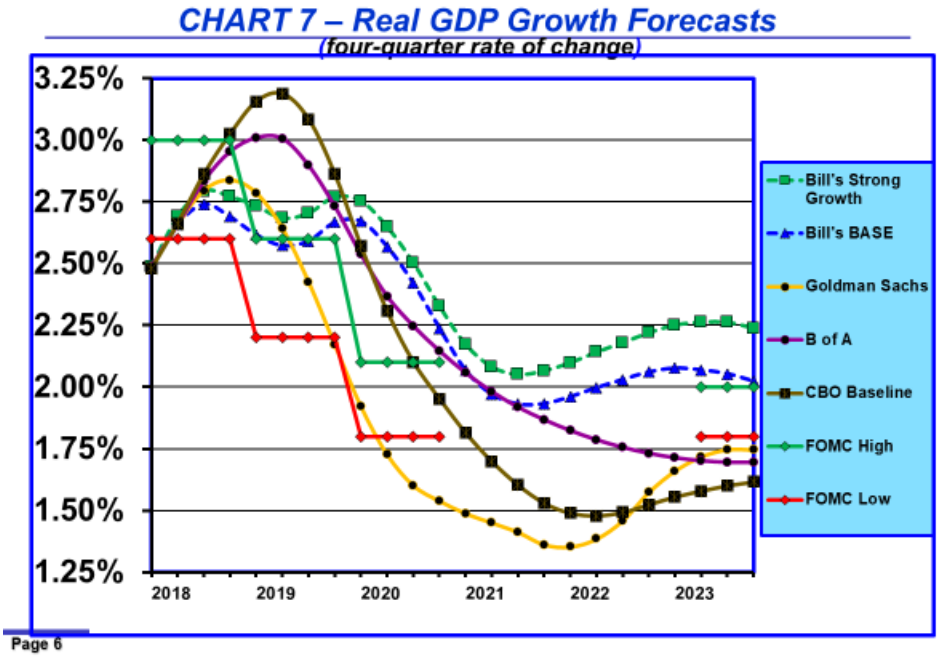
Table 8

Real GDP Growth Forecasts

(year-over-year average)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Actual	2.86	1.49	2.27						
B of A				2.99	2.75	2.15	1.87	1.73	1.70
GS				2.88	2.19	1.54	1.36	1.57	1.75
IHS Markit				2.70	2.70	2.10	1.90	1.90	1.90
Economy.com				2.90	2.60	0.90			
Blue Chip Average				2.70	2.40	2.10	2.00	2.00	2.01
CBO				3.03	2.86	1.95	1.53	1.52	1.62
FOMC High*				3.00	2.60	2.10			
FOMC Low*				2.60	2.20	1.80			
Bill's BASE				2.69	2.66	2.24	1.93	2.06	2.02
Bill's Strong Growth				2.74	2.77	2.33	2.07	2.22	2.24

*Q4 to Q4 – sensitive to specific Q4 values and may diverge from year-over-year trend.



However, because fiscal stimulus comes at a time when the economy is already operating above full employment, monetary policy will be very challenged to engineer a soft landing. The risk of recession in 2020 is significant but not certain.

After 2019 most forecasters expect real GDP growth to track long-term potential, which most believe is in a range of 1.75 to 2.00 percent. Note that **CBO** forecasts growth in 2021 and 2022 to be below potential, which is an assumption necessary to eliminate the positive output gap.

IV. U.S. Employment Developments

Payroll employment growth has averaged 199,750 monthly over the first four months of 2018, slightly higher than 2017's monthly average of 182,333. Thus, hiring remains brisk and well above the natural increase in labor supply, which is growing about 100,000 monthly or perhaps 130,000, if discouraged workers are returning to the labor force. Consequently, the labor market continues to tighten. The unemployment rate fell to a new cyclical low of 3.9 percent in April and remains at the lowest level in 16 years. All agree that the unemployment rate is below the natural rate, which means that the labor market is tight. All also expect the unemployment rate to decline further in coming months as the economy responds to massive fiscal stimulus.

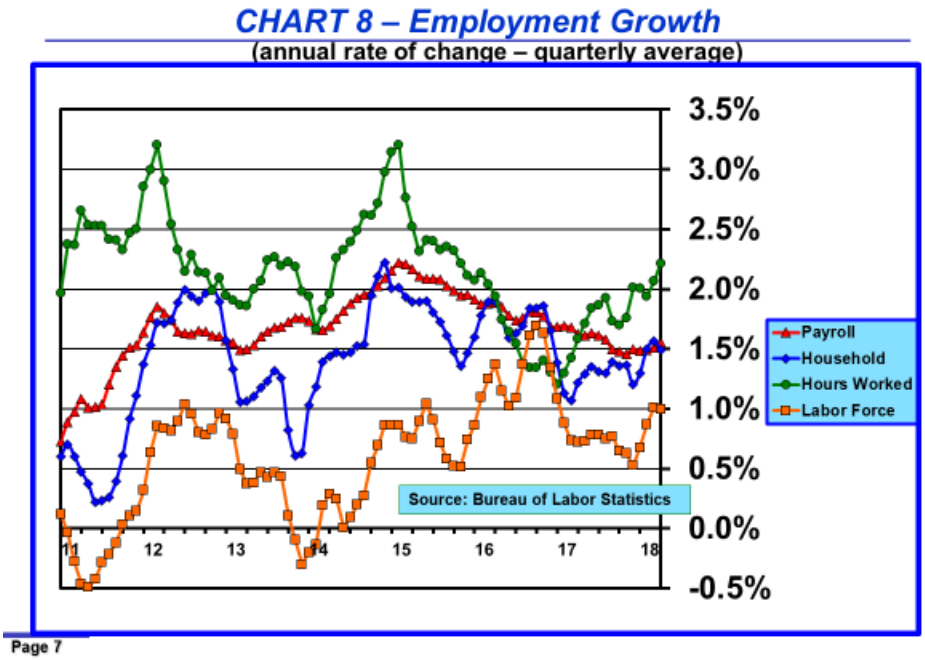
However, disappointing to some and somewhat perplexing, considering strong payroll employment growth and low unemployment, is the failure of wages to show much upward momentum.

1. Employment Growth

Chart 8 shows the four measures of employment growth – payroll employment, household employment, total hours worked, and the growth rate in the eligible labor force, which indicates the expected equilibrium rate of employment growth when the economy is at full employment. When growth in the various measures of employment exceeds growth in the eligible labor force, the unemployment rate declines and the labor market tightens. This is exactly what continues to happen currently.

As can be seen in **Chart 8**, the trend in the annual rate of quarterly growth in payroll employment slowed gradually from the cyclical peak of 2.27 percent in February 2015 to 1.39 percent in September 2017. However, since then payroll growth has accelerated as the economy picked up momentum. The annual growth rate was 1.56 percent in April and is expected to rise to 1.70 percent by the end of 2018.

Household employment growth also had been decelerating gradually, averaging 211,600 in 2015, 174,800 in 2016, and 148,900 in 2017, but, like payroll employment. growth bottomed at 1.30 percent in August 2017 and has since accelerated to 1.49 percent in April. Payroll and household employment growth generally are similar when averaged over several months but can diverge substantially from month to month, primarily due to sampling error.



Over the past 12 months the annual rate of quarterly household employment growth has been 1.49 percent, similar to payroll employment growth of 1.55 percent. Growth in these two measures of employment should be nearly identical over long periods of time, but as is clear in **Chart 8**, the growth rates can diverge at times.

Growth in total hours worked by all employees had been slowing as well. But, like the other employment measures, growth bottomed in 1.21 percent in January 2017 and has accelerated since then to 2.22 percent in April. Growth is higher for this measure because the length of the workweek has risen from 34.38 hours to 34.43 hours. This is also indicative of a very tight labor market.

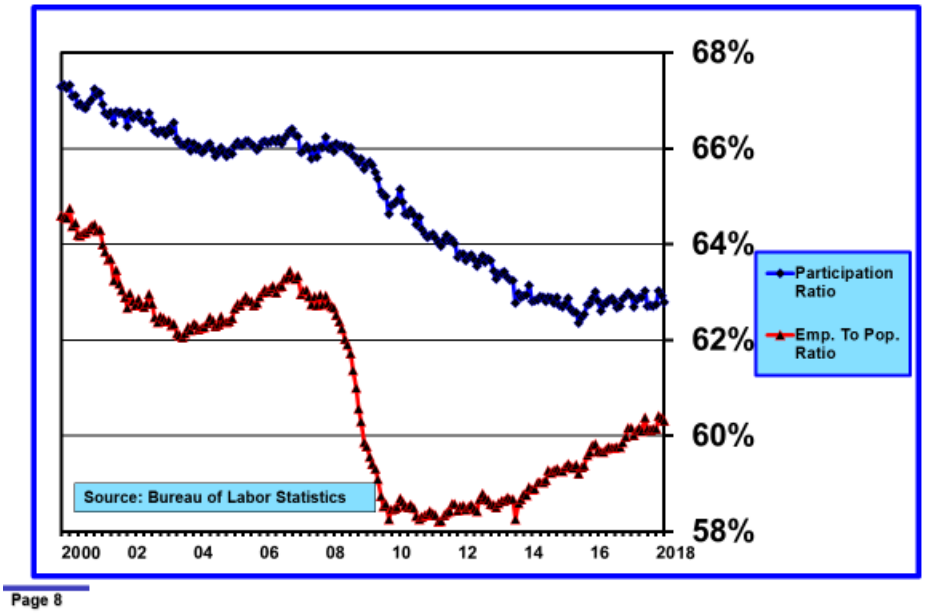
2. Employment Participation

Employment participation had been declining until about a year ago, reflecting changes in demographics and an increase in discouraged workers exiting the labor force due to poor job prospects during and following the Great Recession. Between 50 and 75 percent of the downward trend in participation has been driven by retiring

baby boomers and, according to **CBO**, this trend should continue to reduce participation by about 0.16 percent annually over the next ten years.

As the labor market continues to tighten, however, it appears that most of those accounting for the other 25 to 50 percent of the decline in the participation rate since the Great Recession have returned to the labor force.

CHART 9 – Labor-Force-Participation and Eligible-Employment-to-Population Ratios (U-3 Measure)



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Because discouraged workers are not counted in the labor force there has been debate about their numbers and whether they would reenter the labor force once the labor market tightened. As can be seen in **Chart 9**, the increase in the participation rate from 62.35 percent in September 2015 to 62.78 percent in April 2018 is evidence that most discouraged workers have reentered the labor market in the last couple of years as jobs have become more abundant. If that were not the case, retirements would have driven the participation ratio down to about 61.94. This is a swing of approximately 1.37 million workers many of whom were probably discouraged but have now reentered the labor force.

There is one category in which participation fell substantially following the Great Recession. This category is prime-aged males from 25-54 years of age. Participation for this category declined from 90.5 percent to 88.0 percent and has only recovered modestly to 88.5 percent over the past two years. And, even this small improvement is more than accounted for by those aged 45-54. In contrast, participation of prime age women has recovered to the pre-Great Recession level.

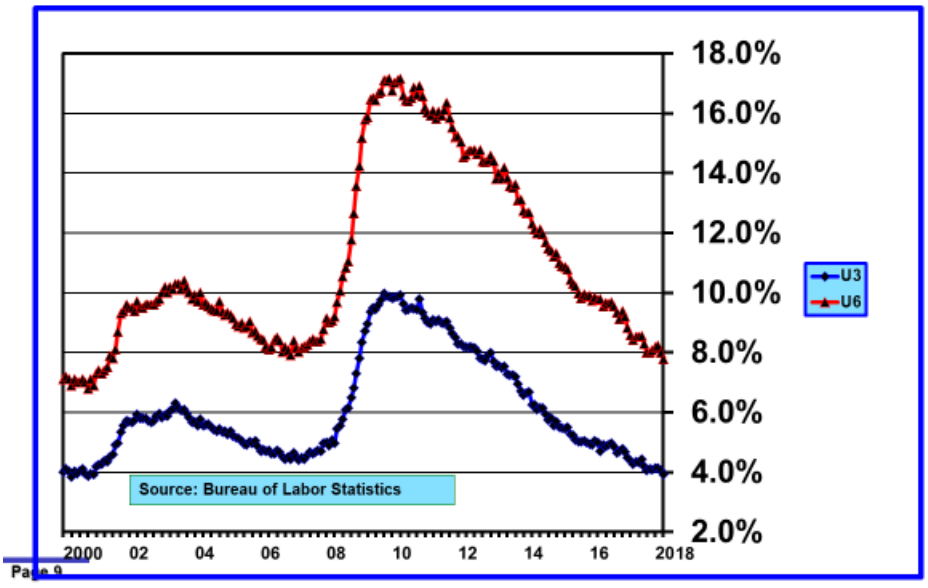
Some of the decline in prime-age male participation is due to structural change involving more at-home dads whose spouses pursue professional careers. However, there is evidence that a considerable portion of the decline stems from social issues. For example, the incarceration rate of prime-age males in the U.S. is more than 3 times the level in the next highest country. Mortality rates have ceased to improve in recent years and are considerably about rates in other developed countries – 2.5 percent versus 1.5 percent. The opioid epidemic among prime-age males is surely a factor. And, some cite video-game addiction as a contributing factor.

Analysts do not expect prime-age male participation to improve much and consequently the labor market will continue to tighten and employers will increasingly complain about an inadequate supply of skilled workers.

3. Measures of Unemployment Reflect a Labor Market That Is Above Full-Employment

As can be seen in **Chart 10**, the U-3 unemployment rate has fallen to 3.93 percent and is now below the minimum level reached prior to the Great Recession and is nearing the low of 3.88 percent reached in October 2000 just prior to the 2001 recession. The April U-3 unemployment rate was considerably below **CBO's** full employment (NAIRU) estimate of 4.62 percent.

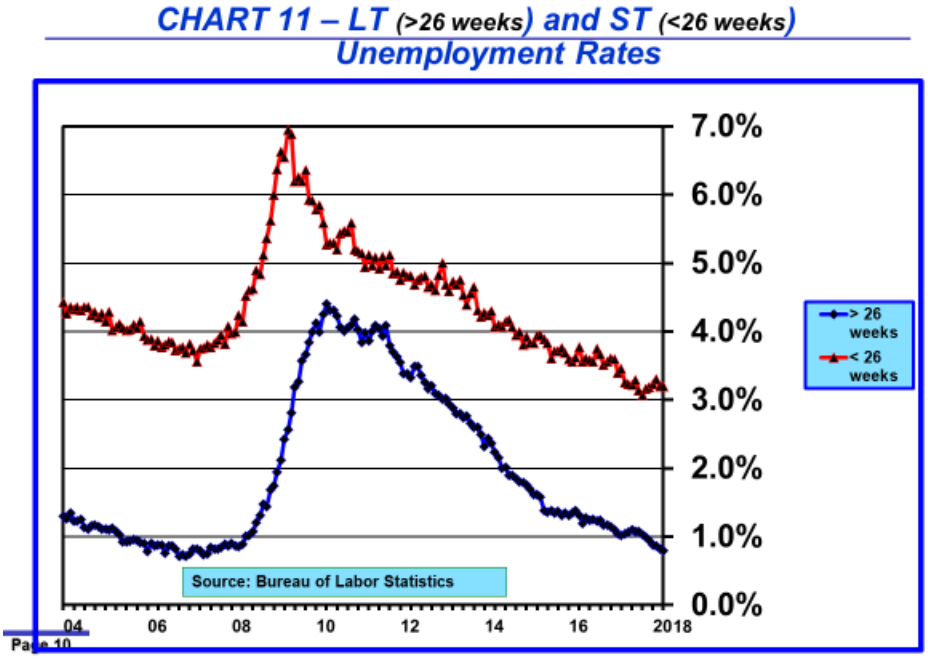
CHART 10 – U-3 and U-6 Unemployment Rates



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 7.79 percent, and is now below the pre-Great Recession low of 7.92 percent reached in December 2006. This measure is likely to continue falling and in coming months challenge the October 2000 low of 6.8 percent. The U-6 measure of unemployment has fallen 207 basis points since the end of 2015 compared to a decline of 107 basis points in the U-3 measure, which underscores an improving labor market that now increasingly exceeds full employment.

Long-term and short-term unemployment rates are also indicators of labor market tightness and are shown in **Chart 11**. The short-term unemployment rate has now fallen well below the minimum level reached prior to the Great Recession. The long-term unemployment rate has declined from over 4 percent in the aftermath of the Great Recession to 0.80 percent in April and is closing in on the previously cyclical low of 0.71 percent reached in October 2006 just prior to the onset of the Great Recession. However, the measure historically has fallen even more during tight labor markets. The low was 0.42 percent in November 2000.



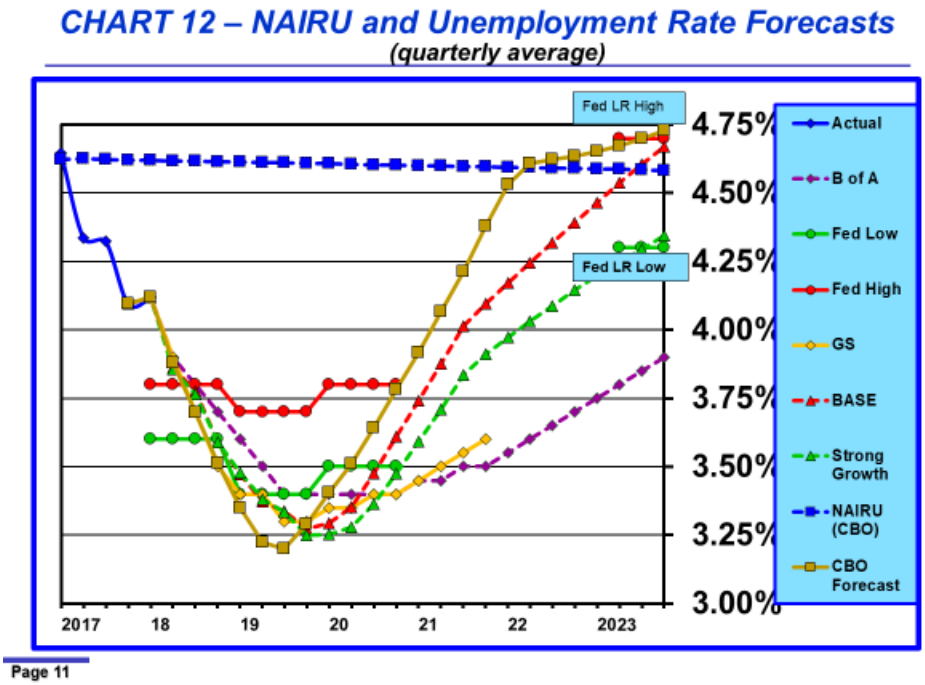
4. Forecasts of the U-3 Unemployment Rate

Forecasters expect the labor market to continue to tighten. The current U-3 unemployment rate is 69 basis points below **CBO's** full-employment estimate of the non-accelerating inflation rate of unemployment (NAIRU).

As the term NAIRU implies, when unemployment falls below this level for any length of time not only is it likely that wages will increase but inflation will probably increase as well. For that reason, the **FOMC** is now crafting 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. The recent acceleration in economic growth, both domestically and globally, have emboldened the **FOMC** to "normalize" monetary policy more rapidly.

Chart 12 shows U-3 unemployment rate forecasts for **B of A**, **GS, CBO**, **FOMC** high and low range, and my "**BASE**" and "**Strong Growth**" scenarios. **CBO's** estimate of NAIRU is also shown in **Chart 12**.



Most forecasters project the unemployment rate to continue falling until mid to late 2019 to approximately 3.25 percent. After that most forecasters also expect the unemployment rate to rise slowly but to remain below **CBO's** NAIRU for an extended period. The **FOMC's** projections for the unemployment rate are similar to those of other forecasters, falling to a range of 3.4 percent to 3.7 percent in 2019 and 3.5 percent to 3.8 percent in 2020 and then rising gradually to a long-run stable NAIRU range of 4.3 percent to 4.7 percent, which is consistent with the emerging consensus view.

My unemployment rate forecasts in the **"BASE"** scenario and bottoms at 3.27 percent in the fourth quarter of 2019. This parallels projections of the **FOMC** (low end of the range)**, B of A**, **GS** and **CBO**.

Barring advent of a recession, the unemployment rate is expected to remain below **CBO's** April 2018 natural unemployment rate estimates for several years. **CBO**

forecasts that the unemployment rate will bottom at 3.20 percent in third quarter of 2019 and then rise gradually over the next two years, reaching the neutral rate of unemployment in the second quarter of 2022.

After 2019 most forecasts, including the **FOMC's** long-run projected range, move upwards gradually but, except for **CBO's** forecast, the unemployment rate remains below **CBO's** estimate of NAIRU for several years.

All of these forecasts, including my own, seem a bit too tidy. Forecasters acknowledge that the labor market cannot remain overheated perpetually and so all expect the unemployment rate to bottom in about 18 months and then gradually return to a less overextended state. The problem with this is that historical experience doesn't substantiate this benign scenario. In the past, whenever the unemployment rate has moved up by approximately 0.3 percent, a recession almost always has ensued and the unemployment rate has risen much more and much faster than these scenarios assume. If there is a reality check, it is most likely to occur sometime during 2020, which just happens to be a presidential election year.

Increasingly, it appears that structural changes in the labor market have lowered NAIRU to a greater extent than indicated by **CBO's** estimates, even though it lowered its estimate of the neutral rate of unemployment by about 12 basis points in its April 2018 revision. The implication of a lower NAIRU is straightforward – the labor market is not quite as tight as past cyclical experience would imply. To the extent that this turns out to be the case there will be less upward pressure on wages and inflation and the **FOMC** could slow the rate at which the federal funds rate is normalized. While financial markets seem inclined toward this view, the **FOMC** remains on a course to raise the federal funds rate much more than financial markets currently expect.

5. As the Labor Market Has Tightened, Wage Growth Has Accelerated Less Than Expected

Now that the labor market is above full employment, theory and experience indicate that growth in wages should be accelerating. That is what is supposed to happen when excess supply disappears and demand is increasing. The data indicate this is occurring but to a more limited extent than historical experience implies should be the case.

Historically, there has been considerable inertia in wage adjustments which has resulted in a slow rise in average wages even after the labor market has reached or exceeded full employment. Inertia may be greater in this cycle than previously for several reasons. First, collective bargaining power provided by unions on the behalf of labor continues to decline as a catalyst for higher wages. Second, because wage

increases might not have slowed as much as they could have during the extended period of labor market slack, there may be less pressure to increase wages as much now that the labor market has tightened. Third, lingering employee long-term job insecurity may be dampening demands for higher wages. Responses to a University of Michigan survey question addressing concerns about layoff risk over the next five years remain elevated. Also, the long-term unemployment rate remains elevated. Fourth, falling inflation expectations may also be a factor. Fifth, retirement of high-wage baby boomers and replacement with low-wage new entrants may be depressing the average level of wage rates, which would moderate the average rate of wage increases. Sixth, there may be more capacity in the labor market than **CBO's** NAIRU unemployment rate implies, if NAIRU has declined. The **FOMC's** Summary of Economic Projections implies a median estimate of NAIRU of 4.5 percent and the median estimate from the Survey of Professional Forecasters is 4.5 percent compared to **CBO's** current estimate of 4.62 percent.[10] Seventh, low productivity gains in recent years may also be a factor in retarding wage rate acceleration.

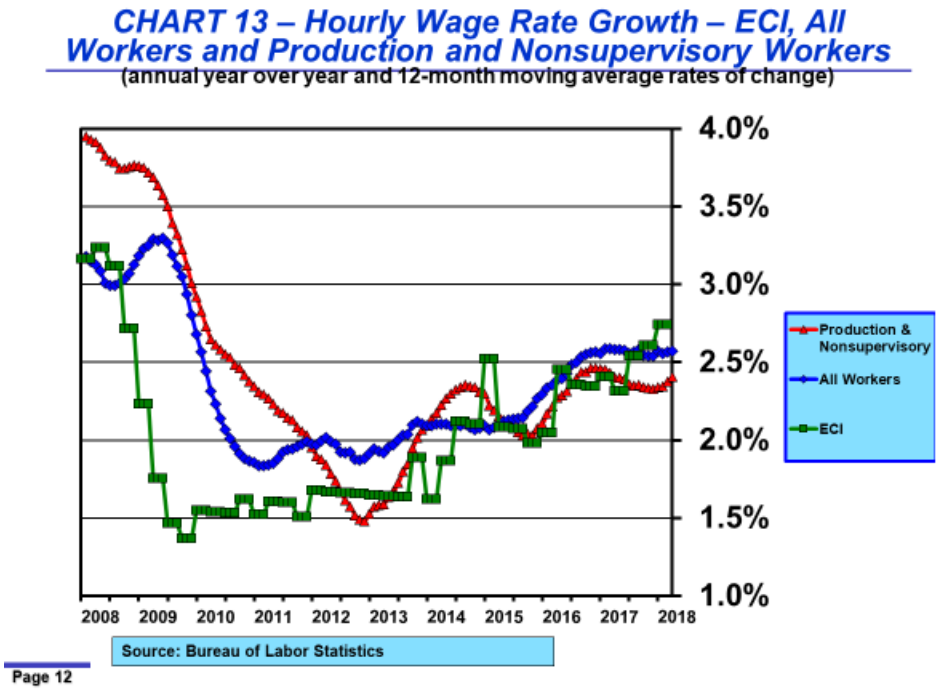
As can be seen in **Chart 13**, increases in wage growth are following the traditional upward cyclical trend as the labor market tightens. But those increases are not as great as historical experience indicates should be occurring. Consequently, forecasts of wage rate increases, which have been based largely upon historical relationships, have been consistently higher than have materialized.

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 wages and salaries, benefits, and total compensation indices (see **Chart 12**). A third measure is also released quarterly as part of **BLS's** report on output, total hours worked, and productivity.

Chart 13 shows the rate of growth in hourly wages for all workers, production and nonsupervisory workers, and ECI (total wages and salaries). All three sets of measures in **Chart 13** track each other closely over time. All three measures had

[10] Regis Barnichon and Christian Matthes. "The Natural Rate of Unemployment over the Past 100 Years," Federal Reserve Bank of San Francisco Economic Letter, 2017-23, August 14, 2017. In this paper, the authors conclude that NAIRU has fluctuated within a tight band of 4.5 percent to 5.5 percent over the past 100 years. The authors' estimate of the current level of NAIRU is close to the lower bound of this range.

been rising gradually, but growth has stalled over the past year for the all workers and production and nonsupervisory workers measures.



Although these measures are highly correlated over time, because compilation methodologies differ for each set percentage changes over fixed time periods will not always be in sync. Currently, all three sets are exhibiting a similar level and trend. Increases in average hourly wages (12-month moving average) of all employees have been stable, rising 2.57 percent annually over the past 12 months compared to 2.58 percent a year ago. Increases in average hourly wages (12-month moving average) of production and nonsupervisory workers have also been stable, rising 2.41 percent annually in April compared to 2.40 percent a year ago. ECI growth in wages and salaries has accelerated from 2.41 percent in the first quarter of 2017 (4-quarter moving average) to 2.74 percent in the first quarter of 2018.

To a certain extent, focusing only on hourly wages is a bit misleading. Growth in average weekly earnings for all employees, which factors in the length of the workweek and thus incorporates changes in the mix of full and part-time employees, has been accelerating relative to growth in hourly wages, rising from 2.16 percent in April 2017 to 2.74 percent in April 2018 (see **Chart 14**). This outcome reflects primarily an increase in the average length of the work week from 34.38 hours in April 2017 to 34.43 hours in April 2018.

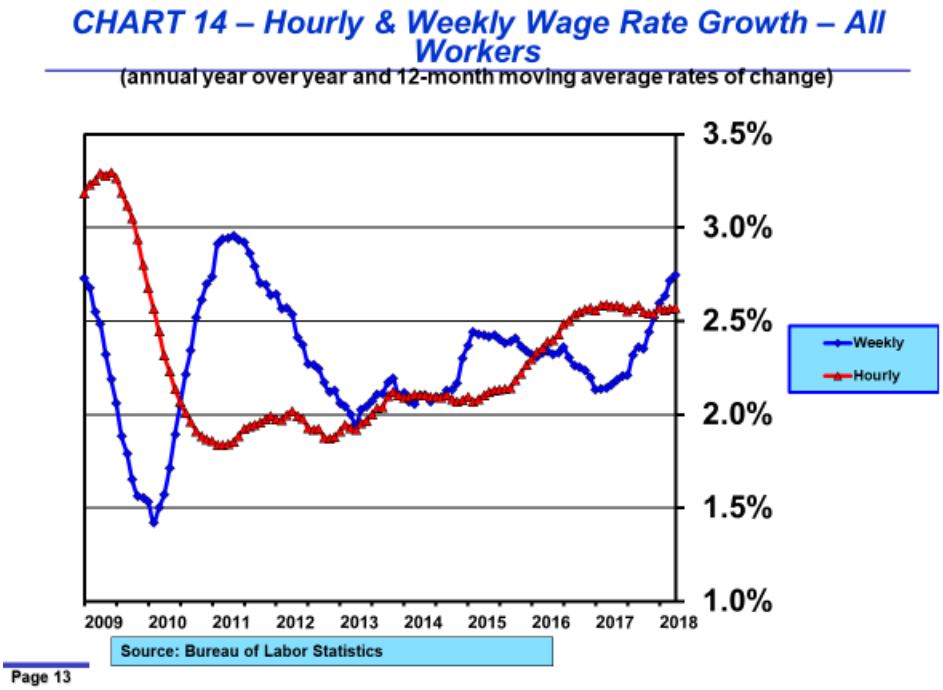
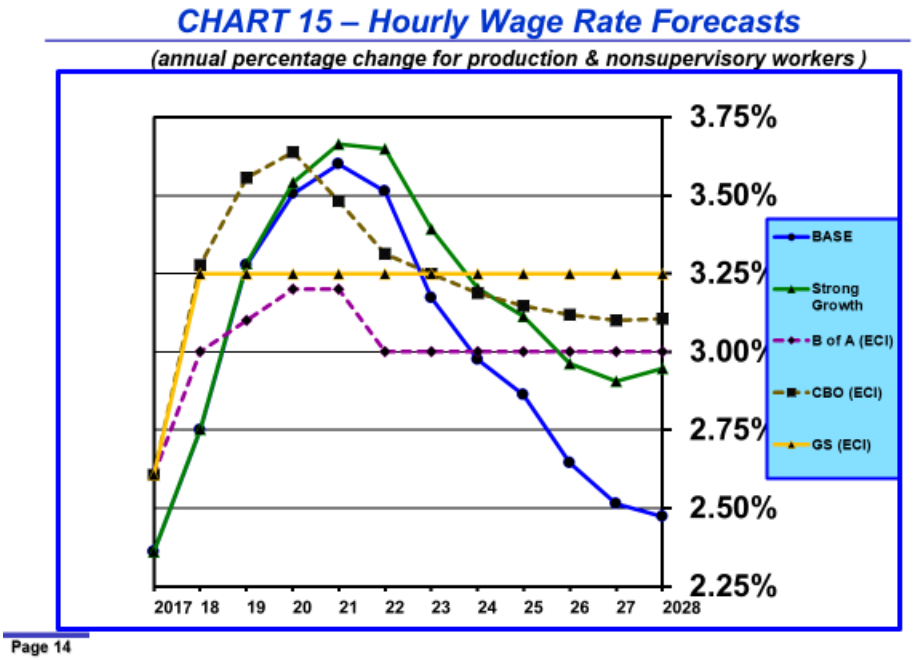


Chart 15 shows **CBO's, GS's** and **B of A's** projections for growth in the wages and salaries component of ECI for all workers and my projections for wage growth for production and nonsupervisory workers over the next ten years.



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 at every point in time. **GS's** ECI wage growth forecast rises to 3.25 percent by 2018 and remains at that level thereafter. **B of A's** ECI forecast rises to 3.2 percent in 2020 but then recedes to 3.0 percent by 2022. **CBO's** ECI forecast rises to 3.64 percent in 2020 but then slows to 3.1 percent over the next several years.

Forecast wage growth for production and nonsupervisory workers in my "**BASE**" and "**Strong Growth**" scenarios lags **CBO's, B of A's** and **GS's** projections, not exceeding 3.0 percent until 2019. Thereafter, however, wage growth in my "**BASE**" scenario peaks at 3.6 percent in 2021 and then begins to decelerate. After 2023 my wage growth estimates are weaker than those of other analysts. That result is driven by a decline in the labor market gap, slowing inflation and lower productivity improvements.

Wage growth in my "**Strong Growth**" scenario follows a similar pattern to that of my "BASE" scenario, but at a higher level. The sharp increase in wage growth reflects strengthening wage bargaining power due to the excess of labor demand relative to supply and also to greater increases in inflation.

GS's wage tracker registered 2.6 percent in April, about 50 basis points short of **GS's** long-run expected 3.0 – 3.25 percent annual rate of increase. **GS** assumes the unemployment rate bottoms at 3.25 percent by the end of 2019, which is well below NAIRU, 2.0 percent inflation, and 1.0 – 1.25 percent annual productivity increases (nonfarm productivity increases would be higher, about 1.4 – 1.8 percent, as the measure of productivity **GS** cites covers the entire economy, while nonfarm productivity covers only about 70 percent of the economy).

In **GS's** view the recent weakness in wage growth results from inflation and productivity below expected long-run values. In other words, the historical forces determining wage rate growth have not changed. The upward adjustment in wage rate growth will be consistent with historical precedent and levels of the key determinants – inflation, productivity, and labor market slack. **GS** corroborates its view by demonstrating that low unemployment metropolitan statistical areas have experienced faster wage growth acceleration in recent months than high unemployment areas.

GS also compared the recent Federal Reserve's Beige Book wage information with the Beige Books for 1997 and 2006, which were also times when the economy was at full employment. **GS** examined "labor market tightness," "labor market conditions,"

and “wage pressures.” **GS** concluded that the Beige Book assessment of three of these three labor market dimensions is like what happened in 1997 and 2006. In both of the previous cycles, wage growth accelerated in the following year.[11]

While **GS** is sticking to its guns, others are less certain that wage rate growth will accelerate nearly as much.

6. Modeling the Relationship Between Labor Market Tightness and Wage Growth

Economic theory posits that when the demand for labor increases relative to the available supply, wage rates should rise more rapidly. This theoretical concept is embedded in the Phillips Curve. The Phillips Curve defines a statistical relationship in which decreases in the unemployment rate, improvements in productivity and increases in inflation should increase nominal wage growth. A recent **GS** study using city-level data confirmed the reasonableness of the Phillips Curve theoretical framework.[12]

In recent months, the labor market has tightened considerably and the unemployment rate is well below **CBO’s** estimate of NAIRU. However, increases in wage rates have been muted. This has led to speculation about whether the Phillips Curve is dead.

As can be seen in **Chart 15**, analysts, including myself, expect wage growth to accelerate and this acceleration should occur in the next few quarters. These forecasts are based on a Phillips Curve model of wage rate behavior which by and large fits the historical data well. Historically, the apparent slow response of wage rates to a tightening labor market can be explained by time lags between cause and effect and non-linearities in the relationship between labor market variables and wage growth. This historical pattern has repeated predictably over several past cycles and it is this consistency which has prompted forecasters to expect wage rate growth to accelerate in the current cycle.

My statistical estimation of nominal wage rate growth is based upon the following labor variables: short-term unemployment of less than 26 weeks, long-term unemployment of 26 weeks or more, the gap between the U-3 unemployment rate and **CBO’s** NAIRU rate adjusted down in recent months to reflect the consensus view that NAIRU is 4.5 percent, the rate of growth in total hours worked, and the square of total hours worked to incorporate a possible nonlinear relationship

[11] Spencer Hill. “Quantifying Wage Signals in the Beige Book,” US Daily, Goldman Sachs Economic Research, October 4, 2017.
[12] Dann Struyven. “*Will the Phillips Curve Bend or Break?”* US Daily, Goldman Sachs Economic Research, October 17, 2017.

between nominal wage rate growth and the strength of the labor market. The model also includes the other two standard Phillips Curve variables – nonfarm productivity and core PCE inflation.

As short-term and long-term unemployment rates rise and labor market slack expands, increases in nominal wage rates decline. The impact of a change in the short-term unemployment rate is greater and affects nominal wage rate growth more quickly than a change in the long-term unemployment rate.

Growth in total hours worked raises the nominal wage rate, but its incremental effect is nonlinear, which means that when the rate of growth in total hours slows, the growth rate in wages declines at a slower rate. The average lag time between cause and effect is about 2 years, which explains in part the apparent slow response of nominal wage rate increases to acceleration in employment market growth.

Core PCE inflation impacts the nominal wage rate with an average lag of 9 months. A one percentage point increase in core PCE inflation lifts nominal wage rate growth by 73 basis points. Once the labor market has tightened sufficiently, there is probably a positive feedback loop between the increase in the nominal wage rate and changes in inflation, but the statistical analysis indicates that increases in the wage rate lag and depend on increases in inflation to occur first.

Finally, while productivity does have a positive impact on the nominal wage rate, it is smaller than most believe and takes a long-time to have even this small impact. A one percentage point increase in nonfarm productivity raises the nominal wage rate by 33 basis points but this takes an average of 4 years to occur.

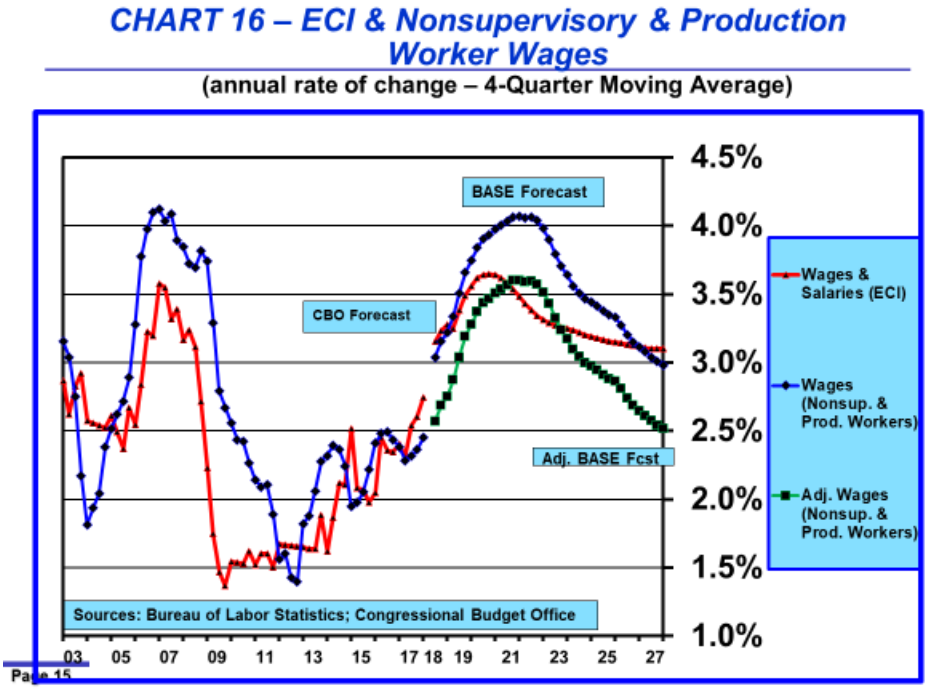
You can see in **Chart 15** how a very tight labor market sustained over time, as is the case in the "**Strong Growth**" scenario, can result in a much higher rate of increase in the nominal wage rate.

Although my econometric model describes well the historical relationships between nominal wage rate growth and the economic variables in the Phillips Curve, over the past 9 months the model has overestimated the rate of increase in the nominal wage rate. The forecast error has been increasing and has averaged nearly 3 standard deviations over the past five months. This pattern has now persisted long enough that speculation that a structural change has occurred in the labor market, which is retarding wage growth acceleration, needs to be taken seriously.

Chart 16 shows that the wage rate for nonsupervisory and production workers and the rate of growth in salaries and wages reported by the **BLS** in the employee cost index (ECI) data respond to the strength of the labor market over the cycle in a similar pattern.

My model's forecast of rising wage rate growth for nonsupervisory and production workers and **CBO's** forecast of rising ECI salaries and wages growth both indicate that wage growth should already be 3.0 percent or greater rather than moving in a range of 2.0 to 2.5 percent over the past two years. ECI appears to have broken out of that range in the first quarter of 2018, rising 2.74 percent.

Furthermore, even if wage growth does accelerate in coming months, it is unlikely to rise to 4.0 percent as indicated in **Chart 16**. In **Chart 16**, I show an adjusted wages and salaries wage growth alternative which subtracts the large forecast error of the last several months. In so doing, the assumption is that the Phillips Curve still will guide wage rate growth in coming months but the level will be approximately 50 basis points lower than it would be if the historical relationship held fully.



If the nominal wage rate does not accelerate in the next few months and close the forecasting error gap, this will provide substantial evidence that a structural change in the historical Phillips Curve has occurred. This is not a trivial matter. If wage rate growth is poised to accelerate, as the model predicts, the FOMC should continue to raise the federal funds rate to contain a buildup in inflationary pressures. However, if wage growth does not accelerate meaningfully, an overly aggressive monetary policy could hasten onset of recession.

V. Monetary Policy

Members of the Federal Open Market Committee (**FOMC**) have gone to considerable lengths in recent years to communicate as clearly and transparently as possible their assessment of the economy and what they collectively believe is an appropriate monetary policy to meet the twin objectives of full employment and moderate inflation.

1. Monetary Policy Making Process

FOMC members gather in Washington, DC eight times a year. At the end of each meeting the **FOMC** releases a statement that contains an assessment of economic activity, employment and inflation and commentary about risks to the outlook. The statement concludes with a summary about the course of monetary policy and specific actions the **FOMC** has decided to implement. For several years at the second meeting during a quarter, members update their economic projections and the chairmen holds a press conference. The intent has been to provide greater transparency about the conduct of monetary policy. In recent years, it has been the practice to announce changes in monetary policy at the second meeting during the quarter. Because the release of economic projections and a press conference follows this meeting, the chairman has the opportunity to explain reasons for any policy changes. As a result, the markets have been rarely surprised in recent years. This has contributed to a lessening of market volatility.

However, the market keeps its own counsel and does not blindly accept indications of future policy that are embedded in **FOMC** member economic projections, the **FOMC** statement, the press conference and speeches given by Federal Reserve officials. While the market does not always agree with the **FOMC's** assessment of the economic outlook and the likely course of monetary policy, it has come to trust the **FOMC** to update its views as new real-time information becomes available and not to blindly pursue a rigid policy agenda.

For the past few quarters, the market forecast for the federal funds rate has had a slower upward trend and a lower terminal value that the projections of all others, including **FOMC** members. In October 2017 the market forecast that the terminal federal funds rate would be 2.00 percent compared to the **FOMC's** and **B of A's** 2.75 to 3.00 percent projections and **GS's** projection of 3.25 to 3.50 percent. However, by early May 2018, the market raised its forecast for the terminal federal funds rate to 2.75 percent. **FOMC** members, **B of A** and **GS** have not changed their estimates for the terminal value of the federal funds rate, which means that the market has come close to agreeing with the **FOMC**.

The market expects four and a half more increases in the federal funds rate to 2.75 percent. The median number of increases forecast by **FOMC** members is seven, followed later as the economy cools, by two decreases for an equilibrium range of 2.75 percent to 3.00 percent (see **Table 10** and **Chart 19**). The market's view has increased by 75 basis points since late last year; however, every other forecaster expects the **FOMC** to increase the federal funds rate considerably above 2.75 percent in coming quarters. And, quite a few, like **FOMC** members, expect the federal funds rate to peak above the long-term equilibrium level in the current monetary policy tightening cycle.

Thus, although the market's view is now closer to that of the consensus of analysts and the **FOMC**, it continues to reflect a less aggressive monetary tightening policy. There is a possible alternative explanation for the market's view. Perhaps the market foresees that monetary policy tightening will be effective more quickly in slowing the economy and preventing an outbreak in inflation so that the **FOMC** will not feel compelled to continue raising rates. After all, there is little disagreement about the long-term equilibrium level of the federal funds rate.

Whatever the reasons, the disagreement between the market and others about the pathway of rate increase and the level of the long-run equilibrium federal funds rate continues. The eventual outcome will depend upon future developments.

2. Beige Book – Assessment of the Economy

Three weeks prior to each **FOMC** meeting, the Beige Book is published. It summarizes in anecdotal form recent economic activity in each of the 12 Federal Reserve districts. The most recent Beige Book covered the period from late February to April 9th. Overall, economic activity is stable, with one district upgrading its assessment. All 12 district banks reported "modest" or "moderate" growth, which means trend real GDP growth is about 2 percent.

Labor markets are considered to be tight, but there is little evidence that wages are accelerating – wage growth was modest in most districts, which means that some pressures exist but there is no acceleration. This is consistent with macro data. Shortages of qualified skilled workers are widespread, but employers are coping with pay increases, overtime, training and automation.

Price inflation was generally characterized as moderate and increased across all 12 districts. The recent increase in commodity and materials prices was noted, particularly steel prices due to tariffs. Transportation are rising, due to increasing fuel prices and a shortage of truck drivers. Building costs are increasing due both to rising commodity costs and a shortage of construction workers. Businesses expect further price increases in steel and building materials.

3. Economic Activity

In the May statement, the **FOMC's** assessment of overall economic activity was identical to its assessment in the March statement: "… economic activity *has been rising at a moderate rate."* The assessment of consumer spending as also unchanged: "*Recent data suggest that growth of household spending moderated from its strong fourth quarter pace*." However, the **FOMC** upgraded its assessment of business investment: "*… business fixed investment continued to grow strongly."* The sentence that was added in March, "*The economic outlook has strengthened in recent months,"* was omitted from the May statement. The **FOMC's** outlook for economic activity was the same in both the March and May statements: *"… economic activity will expand at a moderate pace in the medium term …."* The **FOMC's** May assessment of economic activity was in line with market expectations.

4. Employment

Most believe the labor market has exceeded the non-accelerating inflation rate of full employment (NAIRU). The U-3 unemployment rate in April was 3.9 percent (reported after the **FOMC** released its May statement), which was 0.7 percent ***below*** **CBO's** estimate of NAIRU. The **FOMC** noted that "… *the labor market has continued to strengthen … and the unemployment rate has stayed low*," wording that has been repeated in recent **FOMC** statements. However, it added in the May statement that *"Job gains have been strong, on average, in recent months …."* It repeated its outlook for labor market conditions, stating that "*labor market conditions will remain strong*." "Remain strong" is somewhat of an understatement.

If the U-3 unemployment rate, which is the simple measure used in the monetary policy Taylor Rule to assess what the level of the federal funds rate should be, were the only relevant employment policy measure, the **FOMC's** task to proceed aggressively in "normalizing" interest rates would be unambiguous. 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.

While the **FOMC** overestimated expected real GDP growth for many years until recently, it 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 until recently labor force participation had been much weaker than in previous economic recoveries, 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.

5. Inflation

In its May statement, the **FOMC** upgraded its assessment of inflation by substituting the wording "*moved close to 2 percent"* for the wording in the March statement *"continued to run below 2 percent"*: "*On a 12-month basis, both overall inflation and inflation for items other than food and energy have moved close to 2 percent."* The following sentence in the May statement omitted the phrase *"have increased in recent months but"* in the May statement: *"Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance." M*arket-based measures of inflation compensation have risen about 25 basis points since late 2017.

In the outlook paragraph of the policy statement the **FOMC** opined that: "*Inflation on a 12-month basis is expected to* ***run near*** [replaced "expected to move up in coming months and stabilize around" in the March statement] *the Committee's* ***symmetric*** [added] *2 percent objective over the medium term."* The FOMC deleted the phrase "*is monitoring inflation developments closely*" from the May statement. There were two messages in the revised May language. First, the FOMC acknowledged that inflation is now near its 2 percent objective and expects that to continue. Second, the addition of the word "symmetric" indicates, if inflation rises slightly above the 2 percent objective, that would not be a matter of concern and would not lead by itself to a change in course of monetary policy.

PCE core inflation has averaged 1.7 percent for the past 20 years. During those 20 years, this measure was only 2.0 percent or greater 22 percent of the time. The longest stretch of time above 2.0 percent occurred from 2004 to 2008, which led up to and into the Great Recession. During that time the highest monthly inflation rate was 2.45 percent. Now that the economy is at full employment inflation will probably rise above 2.0 percent and this would be consistent with the waning months of the previous cycle. Whether the **FOMC** can achieve its symmetric 2.0 percent objective on an average basis over the entirety of the economic cycle remains to be seen. The historical record is not encouraging.

6. FOMC Statement – Assessment of Risks

FOMC members concluded that "*Risks to the economic outlook appear roughly balanced."* The phrases *"near term"* and *"but the Committee is monitoring inflation developments closely*" were deleted from the May statement. This change is further evidence of the **FOMC's** confidence that inflation will remain near its 2 percent objective.

7. FOMC Statement – Monetary Policy

As has been its pattern in the its first meeting of the quarter, the **FOMC** did not raise the federal funds rate, but noted that the stance of monetary policy remains accommodative and "*expects that economic conditions will evolve in a manner that will warrant further gradual increases in the federal funds rate* …." The policy paragraph was identical word-for-word with previous recent **FOMC** policy statements.

As has been the case now for several meetings, there was no mention in the policy statement about the balance sheet normalization program, which was commenced in October 2017. Apparently, the **FOMC** regards this as old news and perhaps the lack of mention has been intentional to keep market participants focused on adjustments in the federal funds rate. The market has not focused on the possible longer run implications of balance sheet shrinkage. Perhaps this is because the shrinkage was limited initially, but the monthly shrinkage in the size of the Federal Reserve's balance sheet is steading increasing. Let there be no doubt that liquidity is already being impacted in a meaningful way. Federal tax cuts and spending increases have increased Treasury's borrowing requirements and it will get no help from the Federal Reserve.

Already measures of the supply of money and credit indicate that growth is slowing and "quantitative tightening" and increases in the federal funds rate will only serve to depress growth further. Annual M2 money supply growth has slowed to less than 4 percent for the first time since the days of the Great Recession. Importantly, M2 growth is about a percentage point slower than growth in nominal GDP. This is an end-of-cycle phenomenon that indicates shrinking liquidity, which historically has been a precursor of slower economic growth or recession.

Another indicator of decreasing liquidity is the narrowing of the yield spread between the 10-year and 2-year Treasury securities from 125 basis points at the beginning of 2017 to an average of 46 basis points in early May 2018. The deceleration in growth of money and credit is consistent with a maturing economic cycle but has not yet reached the red zone which in previous cycles has sent a reliable signal of heightened recession risk.

VI. Inflation

Core PCE inflation jumped in March to 1.88 percent as last year's index depressing events, most notably cuts in wireless cell phone pricing, fell out of the index. Core PCE inflation has now returned to almost the same level it was in February 2017 – 1.86 percent. From the vantage point of the present, the behavior of inflation last year seems to have been an anomaly.

FOMC members and other forecasters, including myself, are confident that both core and total PCE inflation will return to the 2.0 percent target level in 2018. This conviction has been bolstered by the realities of an extremely tight labor market and substantial fiscal stimulus that will flood the economy over the next several months.

Table 9

Core PCE Inflation Forecasts – B of A, GS, Bill's "BASE", Bill's "Strong Growth" and FOMC High and Low

Core CPE	2015	2016	2017	2018	2019	2020	2021	2022	2023
Actual	1.37	1.87	1.52						
B of A				1.97	2.00	2.20	2.20	2.00	2.00
GS				2.10	2.20	2.20	2.20	2.00	2.00
CBO				1.77	2.11	2.18	2.17	2.11	2.08
IHS Markit*				2.30	1.70	2.70	2.60	2.40	2.30
Economy.com*				2.50	2.50	2.50			
Blue Chip Average*				2.10	2.20	2.30	2.30	2.30	2.30
Bill's BASE				**2.01**	**2.16**	**2.10**	**1.78**	**1.53**	**1.63**
Bill's Strong Growth				**2.01**	**2.18**	**2.17**	**1.91**	**1.71**	**1.77**
FOMC – High				**2.0**	**2.2**	**2.2**			**2.0**
FOMC – Low				**1.8**	**2.0**	**2.1**			

*CPI – total index; on average CPI averages about 25 basis points higher than CPE

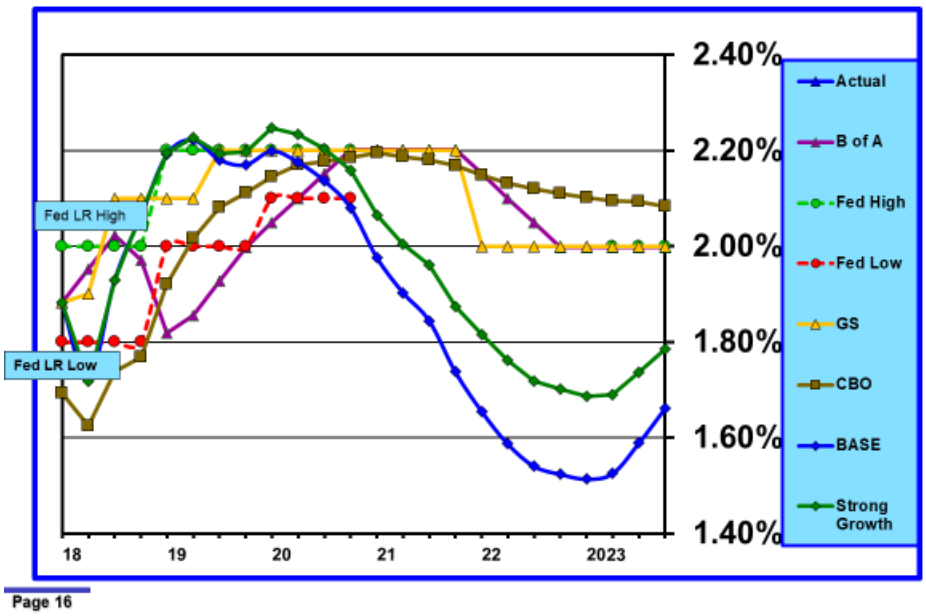
As can be seen in **Table 9** (**Chart 17** shows historical core PCE price index data and data from **Table 9** in graphical form), forecasters, except **CBO**, expect the core PCE inflation index to be near 2.0 percent by the end of 2018. Over the longer run, most, including **FOMC** members, expect core PCE inflation to rise modestly above 2.0 percent but then settle back to that level as economic growth slows and the unemployment rate edges up.

As can be seen in **Chart 17**, my econometric model indicates core PCE inflation will closely track the estimates of others through 2020, but my estimates begin to soften in 2021 and diverge from the consensus view. During 2018, 2019, and 2020 core PCE inflation forecasts in the "**BASE**" and "**Strong Growth**" scenarios rise to 2.2 percent. After that, however, my inflation forecasts fall in a choppy fashion, eventually reaching 1.4 to 1.7 percent by 2028 (see **Chart 18**). **Chart 18** shows core PCE inflation estimates for my "**BASE**" and "**Strong Growth**" scenarios from 2018 to 2028.

While one should never discount the possibility of a sea-change in the economic environment in the future that would set inflation on a different course, there are

reasons that core PCE inflation could move below 2.0 percent in coming years, notwithstanding an economy that is currently operating at full employment. Inflation has averaged 1.70 percent from 1995 to the present. It has only risen above that level during the mature phase of the cycle, which is currently the case. There is little historical support for the view that inflation will remain at 2.0 percent when the economy slows, as it must inevitably, as the **FOMC** tightens monetary policy to a level of the federal funds rate above the long-term equilibrium level. Other secular trends that continue to place downward pressure on inflation, but have been masked by the current strength of the U.S. and global economies, include strong global competition, excess supply, and weak productivity. When the economy cools in response to monetary policy tightening, these trends will reassert themselves.

CHART 17 – Core PCE Inflation
(annual percentage rate)



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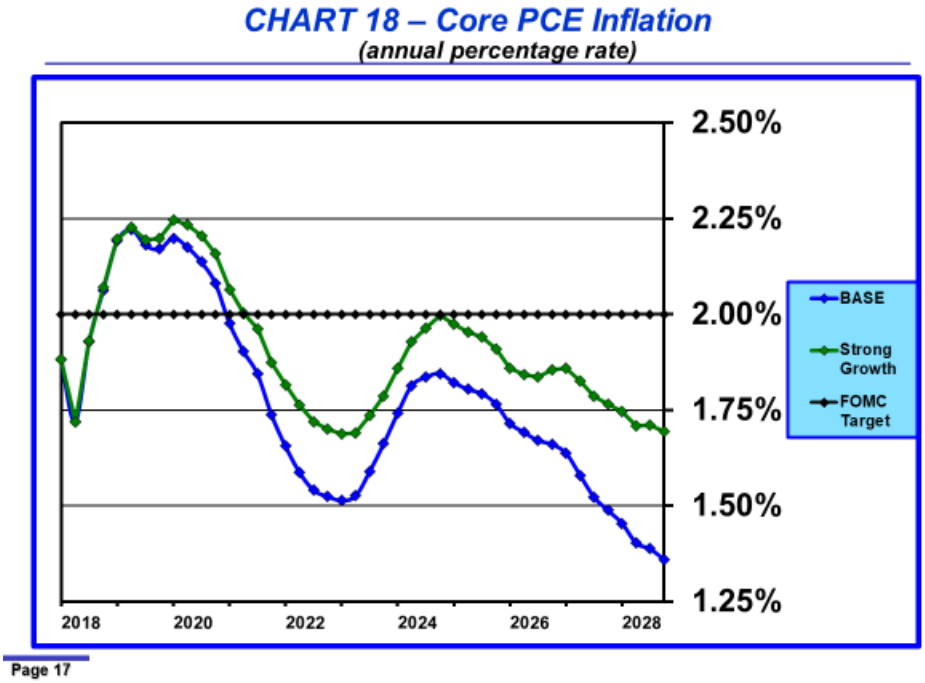


VII. Interest Rates

Interest-rate forecasts depend upon assumptions about employment growth, labor market tightness, productivity, and inflation. Some or many of these assumptions might prove to be inaccurate. Nonetheless, for a plausible range of assumptions, my econometric model provides a bounded range of interest-rate forecasts.

1. Interest Rates – Federal Funds Rate

The **FOMC** raised the federal funds rate 25 basis points at its March meeting to a range of 1.50 to 1.75 percent. **Table 10** shows the forecast pathways for the federal funds rate expected by various analysts over the next several years. The **FOMC's** median pathway and the market's forward yield curve implied pathway are also shown in **Table 10** for comparative purposes.

With respect to the issue of additional increases in the federal funds rate in 2018 and subsequent years, there is considerable divergence among the **FOMC's** own projections, forecasts of analysts and the market forecast embedded in federal funds futures. The expected number and timing of federal funds rate increases made by several analysts, including myself, the **FOMC** and the market is shown in **Table 10**.

Table 10

Number of Federal Funds Rate Increases of 25 Basis Points

	2018	2019	2020	2021-28	Total	Long Run
FOMC – median	**3**	**3**	**2**	**-2**	**6**	**2.75-3.00***
B of A	3	2	2	-1	6	2.75-3.00*
GS	4	4	0	0	8	3.25-3.50*
CBO	4	4	2	-3	7	3.00-3.25*
IHS Markit	3	4	2	-1	8	3.25-3.50
Economy.com	3	6	1	0	10	3.75-4.00
Market Forecast	**3**	**2.5**	**0**	**0**	**5.5**	**2.75**
Bill's BASE	**4**	**7**	**0**	**-6**	**5**	**2.50-2.75#**
Bill's Strong Growth	**4**	**7**	**1**	**-5**	**7**	**3.00-3.25#**

*FOMC, B of A, GS and CBO rates are equilibrium estimates
#Bill's estimates are forecasts which peak above the projected equilibrium rate

In its March Summary of Economic Projections (SEP), the median **FOMC** members' view was three increases in the federal funds rate during 2018 to 2.00 - 2.25 percent; three increases in 2019 to 2.75 - 3.00 percent; and two in 2020 to 3.25 - 3.50 percent, which would lift the federal funds rate 50 basis points above the **FOMC's** expected long-term equilibrium level of 2.75 – 3.00 percent. This seems like a reasonable response to quell the potential inflationary pressures expected to stem from an economy and labor market operating well above full capacity. However, by overshooting the expected long-term equilibrium rate, the FOMC risks triggering a recession.

In the past the SEP projections have proved to be very unreliable guides to future monetary policy. For example, at the beginning of 2016 the **FOMC** median projected four increases in the federal funds rate during 2016. Only one occurred. While many seem to agree that 2018 will see three increases, an increasing number, including myself, now expect four increases.

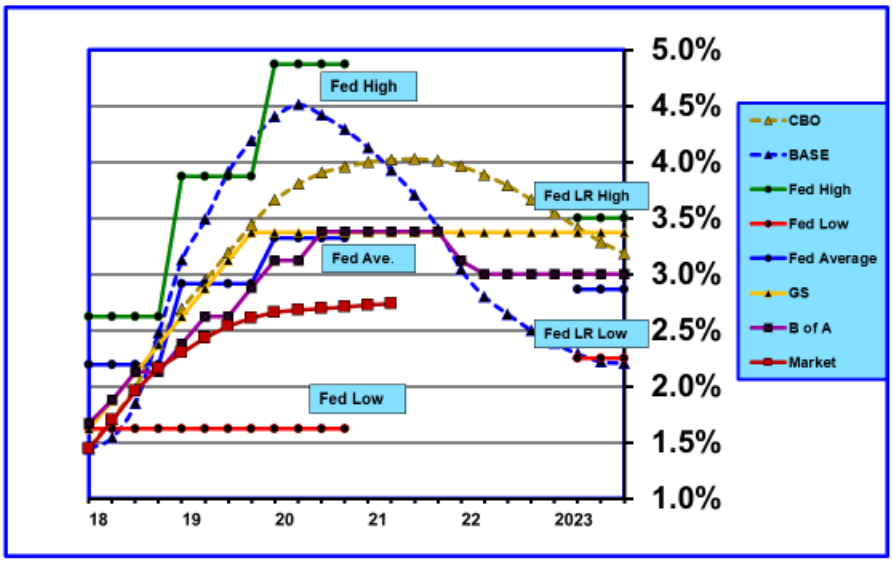
After 2018 there is divergence of opinion about the total number of increases the **FOMC** will implement during the current monetary policy tightening cycle. **GS** expects more tightening than **B of A** and the **FOMC** and a higher equilibrium level of the federal funds rate of 3.25 to 3.50 percent compared to 2.75 to 3.00 percent for the **FOMC** and **B of A**.

My federal funds rate forecast in my "**BASE**" scenario (4.5 percent NAIRU) projects that the **FOMC** will be forced to increase the federal funds rate 175 basis points in 2019 to 4.00 to 4.25 percent, and possibly once more increase in 2020 to 4.25 to 4.50 percent. This trajectory nearly coincides with that of Economy.com. However,

unlike Economy.com's forecast, my model forecasts that the federal funds rate will drop sharply after 2020, presumably because the **FOMC** eases monetary policy to try to engineer a soft landing and avoid a recession. The lower long-term equilibrium rate of 2.50 to 2.75 percent in my long-term "**BASE**" scenario projections is caused by a significant decline in inflation below the 2.0 percent target and to a lesser extent by weak productivity. As a reminder, the long-term projections of my model depend upon assumptions of what might happen rather than what will happen. What is more important to consider as a real possibility, is that the federal funds rate in the short run will peak in a range of 4.00 to 4.50 percent. In that regard my model is in good company because **CBO** is forecasting a peak level of 4.00 percent.

Chart 19 shows the quarterly progression in the federal funds rate from the present through 2023 implied by the **FOMC's** high, low and average projections. It also shows forecasts for **B of A, GS, CBO,** my "**BASE**" scenario and the **market** forecast embedded in federal funds futures.

CHART 19 – Federal Funds Rate Forecasts



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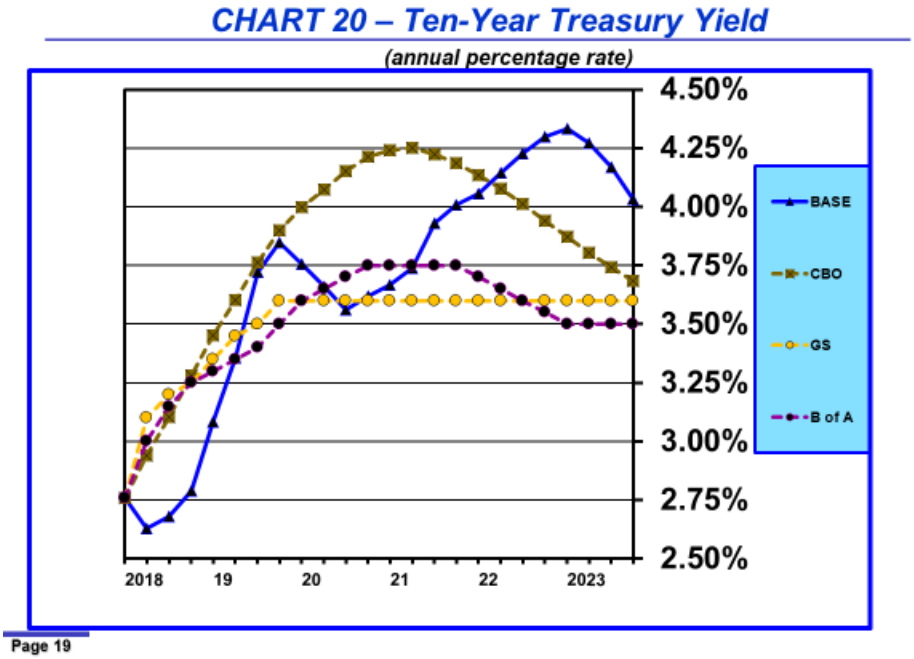
Over the past several years, **FOMC** members have steadily reduced the median estimate of the long-term equilibrium level of the federal funds rate from 4.25 percent to 2.75; the central tendency range is currently 2.75 - 3.00 percent. Based upon my model**,** my sense is that the **FOMC's** median projection for the federal funds rate is reasonable with its estimate of long-term real GDP growth of 1.8 to 2.0 percent and assuming that the real rate of interest when the economy is at full employment and NAIRU is zero is approximately 0.75 percent. In my "**BASE**" scenario, the

equilibrium level of the federal funds rate is 25 basis points lower in a range of 2.50 to 2.75 percent because my econometric model projects inflation to be below 2.0 percent in the long run.

2. Interest Rates – 10-Year Treasury Note Yield

Chart 20 shows forecasts for the 10-year Treasury note yield over the next five years. Over time analysts reduced their forecasts for the ten-year yield. Partly this was a mark-to-market exercise driven by the persistent decline in this yield until this year. But the adjustments also reflected a growing consensus that the long-run equilibrium real rate of interest had declined considerably from its historical level. Analysts still expect long-term rates to rise, but no longer to as high a level.



Assuming an inflation rate of 2.0 percent, my model indicates that the 10-year neutral rate should be between 3.65 percent and 4.20 percent, depending on the level of productivity. The long-term equilibrium rate is 3.60 percent for **GS**, 3.50 percent for **B of A** and 3.70 percent for **CBO**. These estimates do not differ materially from my estimated range. However, since my model projects inflation falling in the long run to approximately 1.5 percent, it also projects that the 10-year yield will fall to about 3.25 percent by 2025.

My forecast for the 10-year yield in my "**BASE**" scenario, which is shown in **Chart 20,** is similar to **B of A's** and **GS's** forecasts over the next three years. However, unlike **B of A** and **GS**, my forecast 10-year yield continues to rise in 2022, reaching

a peak of approximately 4.25 percent, before commencing a gradual decline in 2023 to 3.25 percent in 2025.

CBO's forecast is interesting in that it rises faster and much farther than other forecasts. Like my "**BASE**" scenario, **CBO's** estimate also peaks at 4.25 percent, but about a year sooner, and then declines to a stabilized level of 3.70 percent by the end of 2023. Although **CBO** does not forecast a recession, it does project a substantial slowing in the economy beginning in 2020. And, as that occurs both short-term and long-term rates fall considerably. It will be hard to avoid a recession if the high rates and flat yield curve that **CBO** forecasts for 2020 occur.