

The business cycle is alive and well

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Abstract Have the dynamic relations among macro variables changed markedly since the financial crisis? A dynamic factor model provides consistent evidence of stability across 248 variables. The Great Moderation appears to be ongoing; you cannot reject the hypothesis that the standard deviation of four-quarter GDP growth is the same over 1984–2007 and over 2008–2018. Even so, the apparent slower GDP growth trend implies a substantial probability that a recession may start in the next 2 years, even not adding the risk that some large unprecedented negative event may occur. Because of low interest rates and already-large deficits, the ability of Congress and the Fed to mitigate the effects of a recession are historically constrained.

Keywords Business cycle · Dynamic factor models · Great moderation · Monetary policy

Is the business cycle dead? I can see why this question might be asked as this expansion rolls on. Instead of providing the easy answer (“of course not”) and moving on, I’m going to take the question seriously and break it down into three related questions: whether the time series properties of macro variables have changed since the financial-crisis recession; whether the Great Moderation has returned; and what are the cyclical consequences of the slowdown in the growth of potential GDP. These three

questions all can be framed in reference to Fig. 1, which plots the four-quarter growth of GDP, a low-frequency trend, and the NBER business cycle dates. The latter two points—the decline in volatility and the slowdown in GDP growth—are particularly evident in Fig. 1. My empirical look at these three questions leads me to conclude that the evidence points to the business cycle being alive and well; that we should plan on there being a “next recession”; that this next recession could be just over the horizon; and that, when it arrives, we are in an historically poor position to mitigate its effects.

Let me begin by addressing my first sub-question: Have the dynamic relations among macro variables changed markedly since the financial crisis? I’m going to look at this through a lens of a dynamic factor model with 248 quarterly variables. For those who don’t know what dynamic factor models are, a dynamic factor model assumes that all the co-movements among the 248 variables are driven by a handful of common factors. Now, that doesn’t mean we think there’s only a few things that drive all economic fluctuations! But it is an empirical fact that about four, five, or six factors explain a great deal of the variation of many macro variables in an R-squared sense. My focus here is on whether a dynamic factor model has been stable and whether it continues to explain much of the variation in many macro variables, or alternatively whether all that has broken down since the financial-crisis recession. Specifically, I estimated a six-factor dynamic factor model through 2007, locked in those coefficients, and used it to predict the movements of individual variables in the post-2007 period, given the post-2007 values of the factors.

Let’s start with GDP. Figure 2 shows the actual historical value of four-quarter GDP growth, the fitted values from the pre-2007 model, the out-of-sample projection from the pre-2007 model, and the fitted values using the

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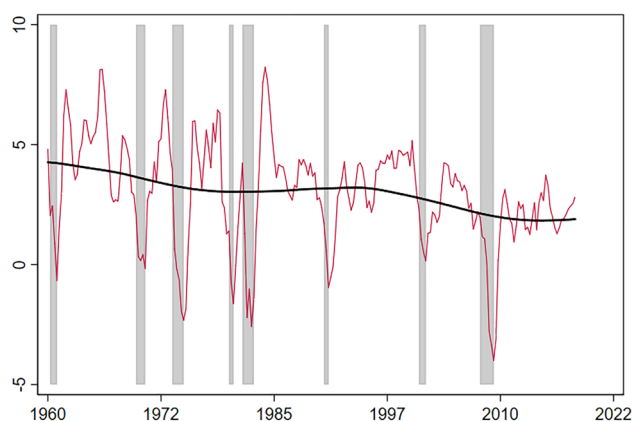


Fig. 1 Four-quarter growth of GDP and long-term trend

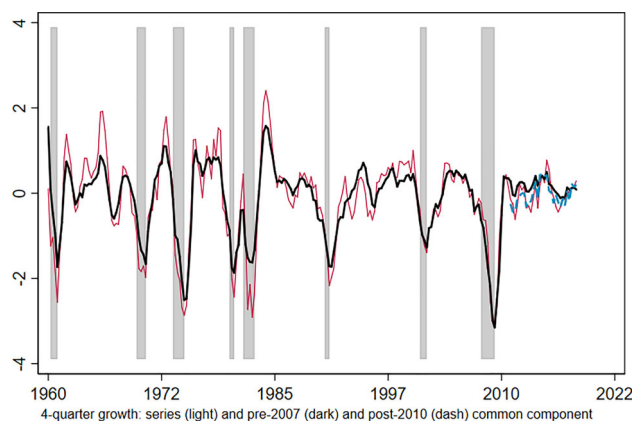


Fig. 2 GDP

model estimated from 2010 to the present. These fitted values are the predicted values from a regression of quarterly GDP growth on the six factors, aggregated up to four-quarter growth rates. For the post-2007 period estimated using the pre-2007 model, the post-2007 factors are used but the pre-2007 regression coefficients are used. Thus, comparing the fits over the post-2010 period of the out-of-sample pre-2007 fitted values with the fitted values from the post-2010 model gives a visual way to assess the stability of the dynamic factor model, in units that are easy to interpret. For GDP, the pre-2007 factor model projected a somewhat more robust early recovery than actually occurred, but overall the pre-2007 model has been tracking GDP growth quite well, especially since 2014.

If you look at consumption (Fig. 3), the actuals and the out-of-sample predicted values are again close to each other and to the post-2010 predicted values, except for a period of slow consumption growth in 2012–2013. This slow growth appeared partly in nondurables but mainly in services (Figs. 4, 5, and 6). The fit for services consumption isn't as good as the other consumption series, either in- or out-of-sample. In particular there is a slowdown in

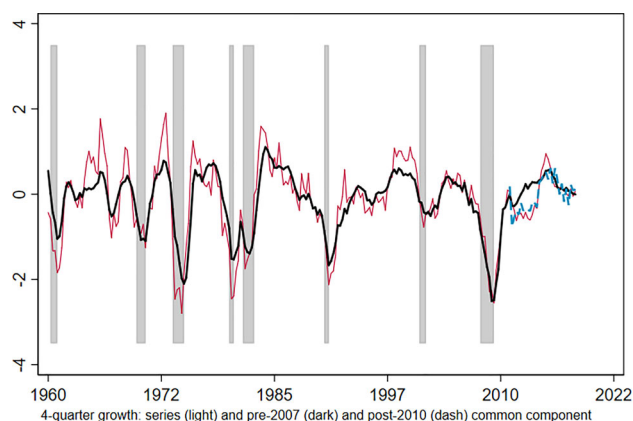


Fig. 3 Consumption

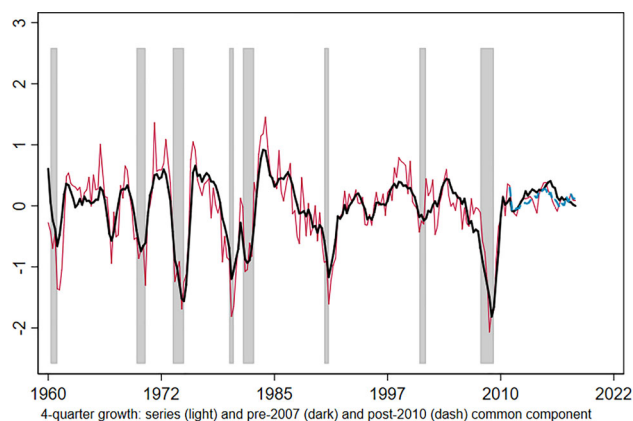


Fig. 4 Consumption-durables

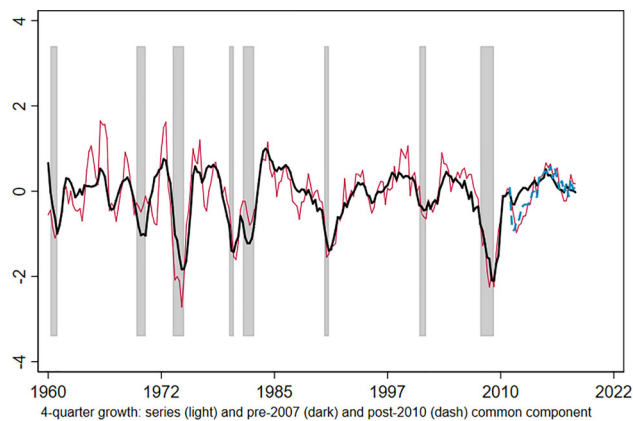


Fig. 5 Consumption-nondurables

services consumption (Fig. 6) in 2012–2013 that is not accounted for by the dynamic factor model.

Private non-residential fixed investment (Fig. 7) is interesting because there has been so much focus on investment being unusually slow. But, in fact, the pre-2007 model does a very good job explaining the mean growth of investment and its variation over the post-2010 period, and,



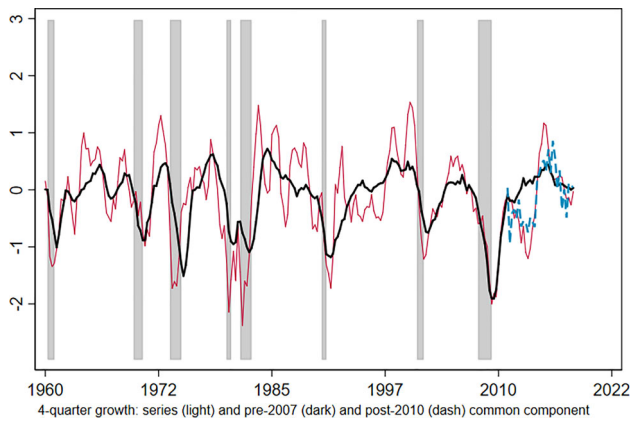


Fig. 6 Consumption-services

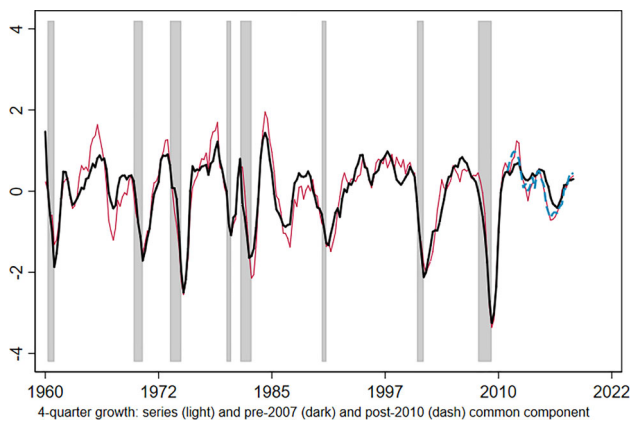


Fig. 7 Private non-residential fixed investment

in fact, you cannot reject the hypothesis that the coefficients in the regression on the factors are stable over this potential break date. The same thing is true for payroll employment (Fig. 8). Interestingly, the pre-2007 dynamic factor model was slightly too pessimistic on manufacturing employment (Fig. 9): there was more of a rebound in

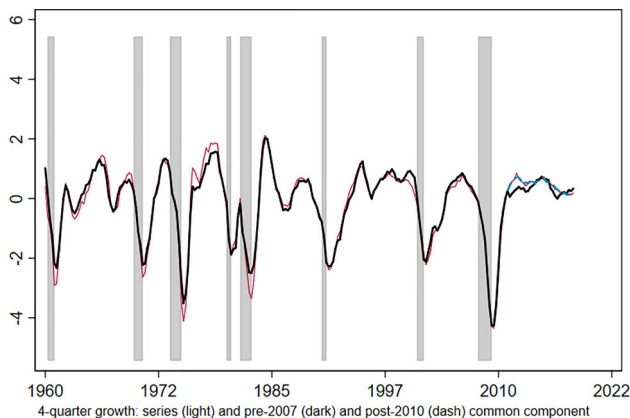


Fig. 8 Private employment

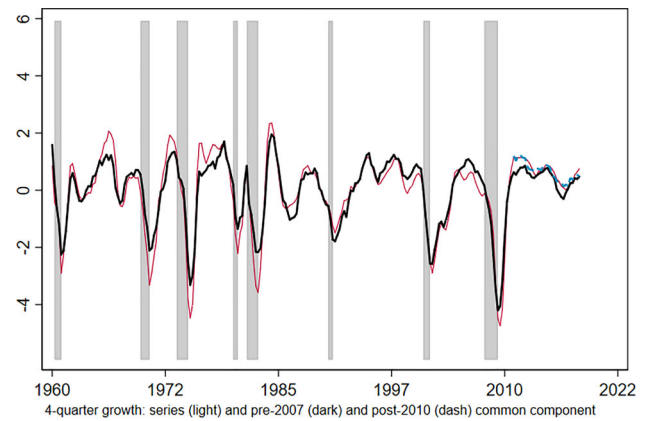


Fig. 9 Manufacturing employment

manufacturing employment than the pre-2007 dynamic factor model would have predicted.

Part time employment for economic reasons is a series that one might think would exhibit breaks because, during this cycle, we had so many years with slack in the labor market. But again, the pre-2007 dynamic factor model is very much on track, so that there are no unusual dynamics in this series (Fig. 10). I find the fit for housing starts (Fig. 11) striking. Any economist would be excused for expecting housing dynamics to be especially aberrant in the recession and early recovery, given the collapse of the mortgage market, the number of underwater homeowners, etc. Yet the pre-2007 model does a very good job tracking housing starts, given the factors, and again the hypothesis of stability is not rejected. The same stability is seen in weekly hours (Fig. 12).

Productivity actually *is* a surprise (Fig. 13). Productivity growth was slower than predicted by the pre-2007 model, given the magnitude of the cyclical slowdown. I think that's something that we all know, even though we don't have a complete explanation for the slowdown.

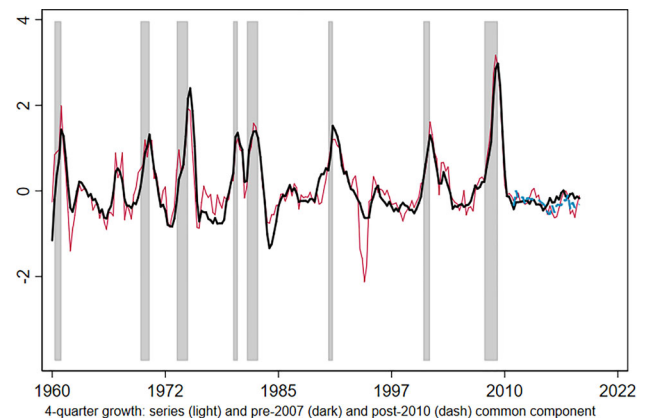


Fig. 10 Part time employment-economic reasons



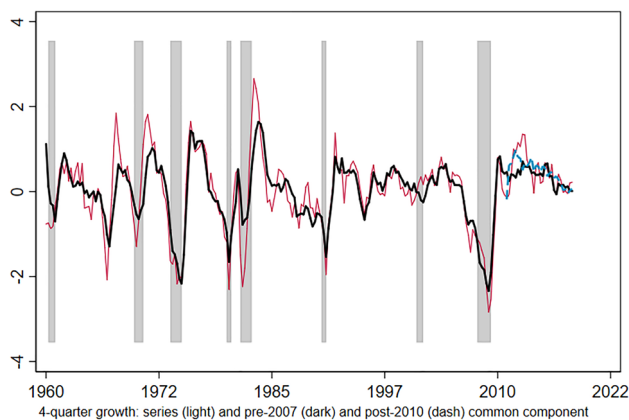


Fig. 11 Housing starts

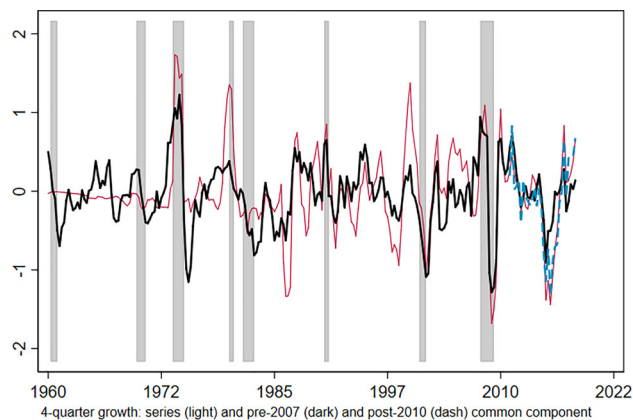


Fig. 14 WTI oil price

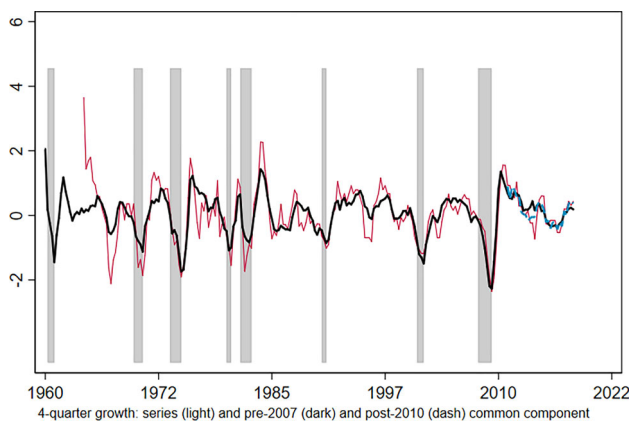


Fig. 12 Weekly hours, non-supervisory workers

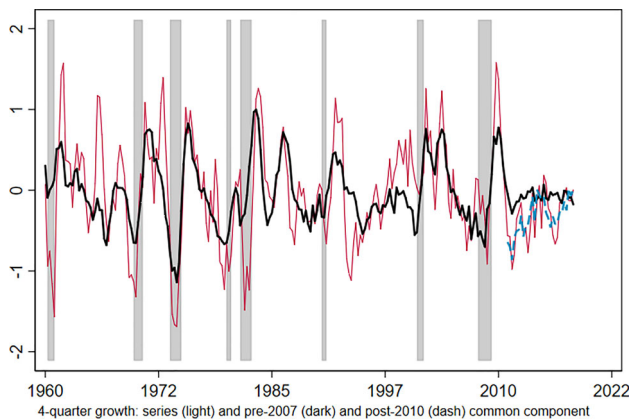


Fig. 13 Labor productivity, nonfarm business

Surprisingly, oil prices are explained pretty well by the factor model (Fig. 14).

Looking across the 248 series, there is consistent evidence of stability of the dynamic factor model, especially once you put aside series that you know have

unprecedented and/or nonlinear behavior, such as the Fed Funds rate getting stuck at the zero lower bound. So, on the first of my three questions—“Have cyclical dynamics themselves changed?”—I suggest that that answer is no.

Let me turn to my second question, the Great Moderation redux (or not). The standard deviation of four-quarter growth from 1984 (the usual date used for the start of the Great Moderation) through 2007 is 1.5% points. From 2008 to mid-2018, this standard deviation is only slightly greater, 1.8% points, and that period *includes* the financial-crisis recession. In fact, you cannot reject the hypothesis that the standard deviation of four-quarter GDP growth is the same over 1984–2007 and over 2008–2018.

If we look only at expansions, this expansion actually has been slightly *less* volatile than the expansions in the 1980s, 1990s, and 2000s. One might wonder if perhaps this is because of a large moderation in some GDP and employment components, but not overall. However, a comparison of the variance for components of real activity (employment, GDP, industrial production) indicates instead that the moderation in the current expansion, relative to the previous three, is a common feature of nearly all real activity variables.

Most economists thought that the Great Moderation died in the financial crisis, so it hasn’t received much study since. You certainly didn’t want your Great Moderation paper, written in 2007, to come out in 2009 because of publication lags! But, looking at the evidence, I now think it’s an open question: The post-1984 reduction in volatility, at least outside of the financial crisis, seems to be an enduring change.

My third question is: What are the business cycle implications of the slower growth trend evident in Fig. 1? One answer is that, all else equal, slower trend growth increases the probability of negative growth and thus of recessions; but not all else is equal, because volatility has

moderated. To quantify the effect of reduced volatility and reduced trend growth, I fit several conventional vector autoregressions using a variety of different series and lags, over the low-volatility post-1984 period and the even lower volatility post-2010 period (here, I only fit small VARs because of the small number of observations). The one parameter that I manipulate is long run growth rate of GDP. Some of the most optimistic supporters of the 2017 TCJA and this Administration's deregulatory agenda might think that this growth rate is 2.5% or even a little bit more. CBO's estimate for 2021–2022 is 1.6%, and some might be even more pessimistic. I therefore ran simulations for a collection of VARs and computed the probability of two consecutive quarters of negative GDP growth sometime within the next 2 years. For shorthand, I will call this a recession although I should stress that the NBER dating committee considers many factors, not just GDP growth.

Not surprisingly, it turns out that the long-term growth rate of potential GDP has a really big effect on the recession probability. Figure 15 reports some curves where the vertical axis is the probability of a recession over the next eight quarters, starting this quarter. The horizontal axis is the long-term growth rate of potential GDP. If you take a growth rate that's in the range of the CBO, these probabilities range from one-third to more than 40%. If you take the most optimistic figures coming out of the Administration or the Republicans in the Senate when the TCJA was passed, then you'd be looking at a much lower probability.

I view the probabilities in Fig. 15 as lower bounds. The reason is that these come from of a business-as-usual scenario, described by a linear VAR with Gaussian errors. Sometimes you get shocks, but because the simulations are based on Gaussian errors, those shocks tend not to be large enough to tip the economy into a recession. However, the history of recessions and why they start is that recessions tend to be triggered by events that are not just “normal” shocks (nerdy pun intended). In contrast, the history of

recessions is that they tend to be triggered by large unexpected events—by infrequent big shocks, if you will. Think of the formation of OPEC in the early 1970s, the Volcker disinflation that just came as a big surprise in 1981, the already-weak economy hit by high oil prices and uncertainty stemming from the surprise invasion of Kuwait by Iraq in August 1990, the 2000 bursting of the dotcom bubble, and of course the financial-crisis recession. I bet we all have a colleague who now says, “Oh, I knew all along that the dotcom bubble would burst,” but in reality we didn't know that all along in real time. These were all surprises that manifested as a large negative shock or a string of large negative shocks. If you admit that there are these large negative shocks, and sometimes a string of them, then the recession probabilities are much higher than those in Fig. 15.

Given this assessment that the business cycle is alive and well, I'm going to indulge a more speculative dive into what the next recession might look like. I'm not going to point a finger at maybe this cause or that cause. Instead, I'm going to take the view that it's really hard to know what the cause is going to be. Still, one thing we *do* know is the world has a way of surprising us, and our history is that such negative surprises regularly tip a late-stage expansion into a recession.

For this reason, the relevant question is: what tools are available for mitigating the next recession when it occurs? Bob Gordon did a very good job talking about the limitations of monetary policy now. A fact that you all know is that during the last three recessions, the Fed lowered the Fed funds rate by about five percentage points. We don't have five percentage points of headroom at the moment, nor will we have five percentage points for a long time.

Thus, just based on the numbers, it seems reasonable that the Fed funds rate will quickly hit the zero lower bound in the next recession. At that point, the Fed will need to decide whether it will engage in quantitative easing. However, doing so would entail political economy risks. The Fed also has other tools, such as forward guidance. The evidence for the success of forward guidance is mixed, and the evidence we have is for a period when the Fed was willing to engage in QE. If the Fed is unwilling or unable to engage in QE during the next recession, it might be harder for forward guidance to be credible. And there is a new wild card: the Fed now needs to deal with an Administration that is willing to attack the Fed and its Chair over the slightest hiccup in the stock market. This development raises new political economy risks to the institution that could have impacts far beyond the next recession. The Fed has evolved into a mature and responsible institution that serves to stabilize the economy not just of the U.S. but of the world, and we all must be concerned that the next

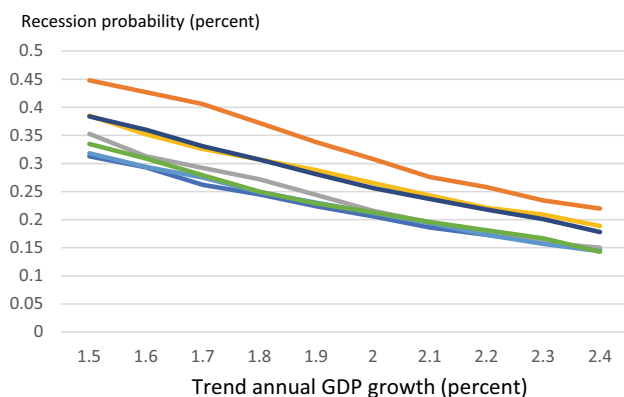


Fig. 15 Recession probabilities over the next 8 quarters from seven VARs as a function of the underlying trend growth rate of GDP



recession could pose risks to the institutional integrity of the Fed.

What about fiscal policy? Of course, there is always the possibility that Congress and the President will act together to produce a bipartisan fiscal stimulus bill in response to the recession, as they have in the past. Perhaps the Democratic House and Republican Senate will put aside jockeying about the 2020 election and do what is right for the country at the time, passing a temporary fiscal stimulus followed by a commitment to stabilizing the debt-GDP path as the economy recovers.

Let me wrap up. The evidence I presented here indicates that the cyclical properties of the main macroeconomic aggregates have been surprisingly stable over this recovery, and where there are instabilities (such as the so-called manufacturing Renaissance), those instabilities are largely understood. The reduction in trend growth, arising for demographic and other reasons, implies a substantial probability of a recession over the next 2 years, even in our current low-volatility regime and even if we suppose that shocks are normally distributed. That probability increases if we allow for the possibility of large shocks such as those that have historically precipitated recessions. And, as many

others including Bob Gordon have suggested, our tools for mitigating the next recession are more circumscribed now than heretofore. All this paints a rather grim outlook, and I must admit that this is one time that I hope my forecasts are wrong.

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