

Don't Panic: The 'R' Word Angst

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MANFRED KEIL, MACKENZIE BRADFORD, AND YAO LI

ABSTRACT: There has been a surprisingly large consensus among professional economists and in the financial press placing the starting date of the next recession within the next two years. Here we focus on financial leading economic indicators to gauge the probability of such an event.. The paper concludes that the evidence supporting an imminent recession is less solid than portrayed by the majority of analysts and the popular press. However, the prospect of such an event has become more worrisome recently even when compared to six months ago.

1. INTRODUCTION

There is a lot of talk going around about the “Recession of 2020” or the “Recession of 2021.” To make matters worse, (i) the volatility in the stock market since February 2018, which received increased attention during the latter half of 2018, (ii) the decline in consumer confidence in three of the last five months (October and November 2018 decline before slightly recovering in December, followed by a dramatic fall in January 2019 and a small recovery in February 2019),² (iii) the record breaking government shutdown in December, (iv) the Conference Board’s Index of Leading Economic Indicators having fallen in December 2018 and January 2019 (two of the last three months),³ and (v) the inversion of the yield curve on March 22 all seem to have moved up the starting date for the next recession to as early as late 2019 in the mind of many analysts. An imminent economic downturn, which seemed somewhat implausible even last summer, is now increasingly on people’s mind.

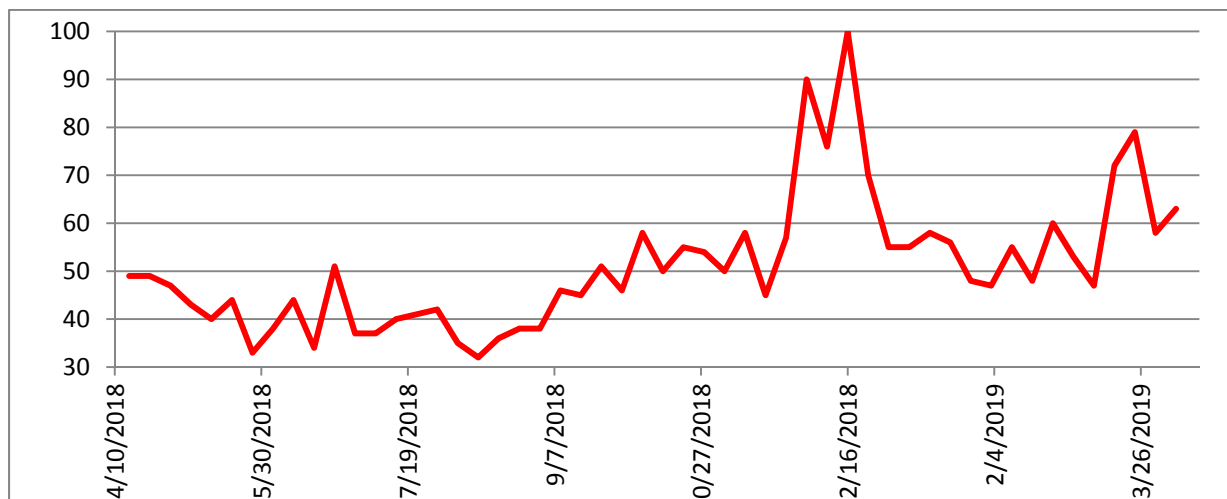
Figure 1 shows the Google Trend graph for “Recession” over the last year: clearly there has been an uptick in the general public interest regarding the possibility of a recession in the near future. Interestingly enough, the highest number of searches were in Washington D.C. The

² The consumer Sentiment Index has by now (April 2019) returned to the December pre-government shutdown level.

³ The LEI increased slightly for February, the most recently available data point.

recent spikes coincide with the government shutdown (December 16-22, 2018) and following the inversion of the yield curve (March 24-30, 2019).

Figure 1: “Recession,” Google Trends, March 12, 2019



Even the Federal Reserve has signaled that it is more likely to see fewer increases if any in the federal funds rate in 2019 than signaled previously, following the statement after the January 2019 meeting. Given the severity of the Great Recession of 2007-2009, and especially the devastating effect it had on certain regional economies, such as the Inland Empire, we will spend some time talking about how to interpret some of the economic signals that might indicate an imminent new recession.

Economists have done a notoriously poor job in predicting recessions. Part of the problem is that the U.S. has only experienced a small number of these episodes during the post-World War II period when data became available at a higher frequency: there have only been eleven recessions in the U.S. since 1946.⁴ Statisticians refer to this as a small sample problem in that you try to infer from a few observations what a much larger population looks like. It is as if

⁴ National Bureau of Economic Research, “U.S. Business Cycle Expansions and Contractions.” <http://www.nber.org/cycles/cyclesmain.html>

you restricted yourself to look at a small number of people with a certain disease to figure out the underlying causes or forecast the next outbreak, where each one of the patients displays somewhat different symptoms, and where the severity of the illness varies across the patients; beyond that, the recovery from the disease does not display a uniform pattern for most of the patients. To make matters worse, there is only a short period before the onset of the disease during which you can forecast with some confidence that the illness will actually occur with a high probability. Yet these are important economic events especially if the subsequent recovery is less than spectacular: some socio-economic sub-groups, such as certain minority groups, younger people, etc. experience unemployment rates that are masked by the average (national unemployment rates reached 10% following the Great Recession). Also there are important regional differences in unemployment rates, such as the City of Coachella and Adelanto in the Inland Empire experiencing Great Depression like peaks of 22%.

Another reason for the poor track record of forecasters is that recessions are most often the result of an unanticipated event or “shock” that hits the economy. Since these events are usually unpredictable, there is little time to forecast an economic downturn once they occur (think of predicting an earthquake or a tsunami). These shocks are typically the result of a monetary contraction, e.g. the Volcker recession (1981/2), oil price hikes (1973/5, 1980, but also 2007/9), or some sort of inventory problem (2007/9). If we had to nominate candidates for a future shock, it might be another prolonged government shutdown, a lengthy trade dispute with China, a renewed debt crisis perhaps in Greece, Italy, Turkey, or Argentina, a global economic slowdown originating in lesser developed countries with dollar denominated debt, etc.

What is a recession? The financial press often refers to these episodes as a decline of at least two consecutive quarters in real GDP. However, in the U.S., recessions are determined by a

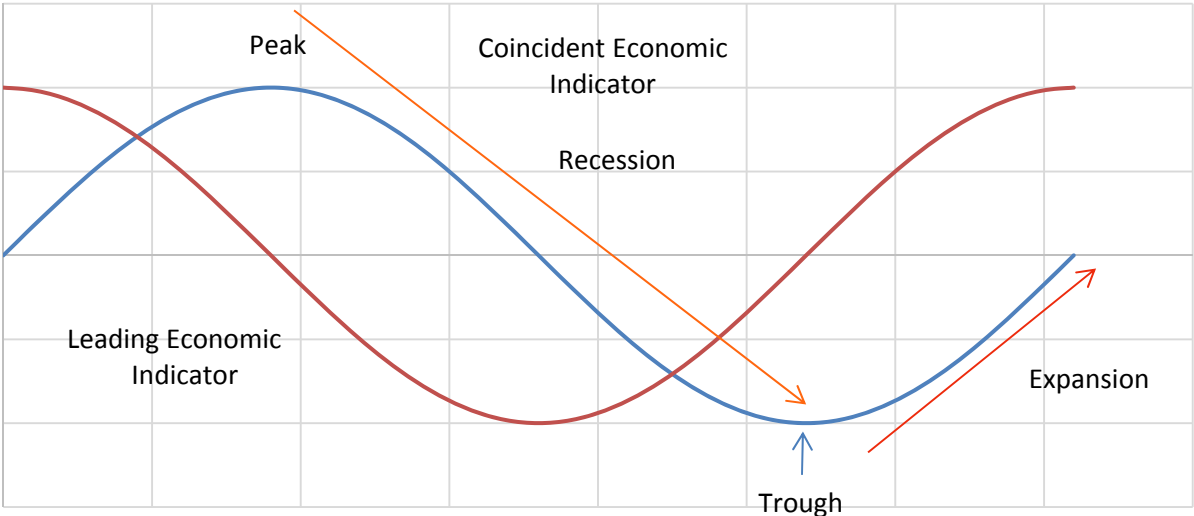
Cambridge, MA between Harvard University and the Massachusetts Institute of Technology (MIT). The NBER does not recognize a recession in terms of two consecutive quarters of negative growth in real GDP. Instead, it defines “a recession [as] a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales” (NBER, 2019). Accordingly recessions are dated by month, not by quarter. For example, the Great Recession lasted from December 2007 to June 2009. If we used the often cited definition of two consecutive quarters of declining real GDP, then the Great Recession would not have started until July 2008 since there was a small positive economic growth during the second quarter of 2008, most likely as a result of the Bush tax rebates.

The task for economic forecasters is then to find early symptoms for the onset of a recession, preferably far enough in advance for policy countermeasures to be put in place to avoid the onset of the recession. This is the equivalent of the doctor administering medicine to prevent the outbreak of a disease. Let these symptoms be called “Leading Economic Indicators” (LEI) while the disease itself can be observed through a set of variables labeled “Coincident Economic Indicators” (CEI). Figure 2 displays the ideal relationship between the LEI and the CEI during a business cycle.

Of course real life observations do not bear much resemblance to this stylized behavior. The length of the recession is typically much shorter than the expansion, there is trend growth in addition to the cyclical behavior, leading indicators do not turn with regularity always ahead of the coincident indicators (“false positives”), there is seasonality involved, etc. In addition, even if the situation was as clear as depicted in Figure 2, there would be a time lag involved between the doctor (policy maker) being aware of the onset of a future disease and the time it takes for the

doctor to administer the medicine (fiscal and monetary policy) in the hope of fixing the problem. This is referred to as the “inside lag,” and it is shorter for monetary policy than for fiscal policy. Even after the medicine is administered (policy is switched to expansionary), assuming that it is available, it takes some time for the medicine to take effect. This time difference is referred to the “outside lag” and it is shorter for fiscal policy than for monetary policy. To make matters worse, these lags are not constant in different economic situations (“long and variable policy lags”).

Figure 2: Stylized Behavior of Leading Economic Indicators and Coincident Economic Indicators during the Business Cycle

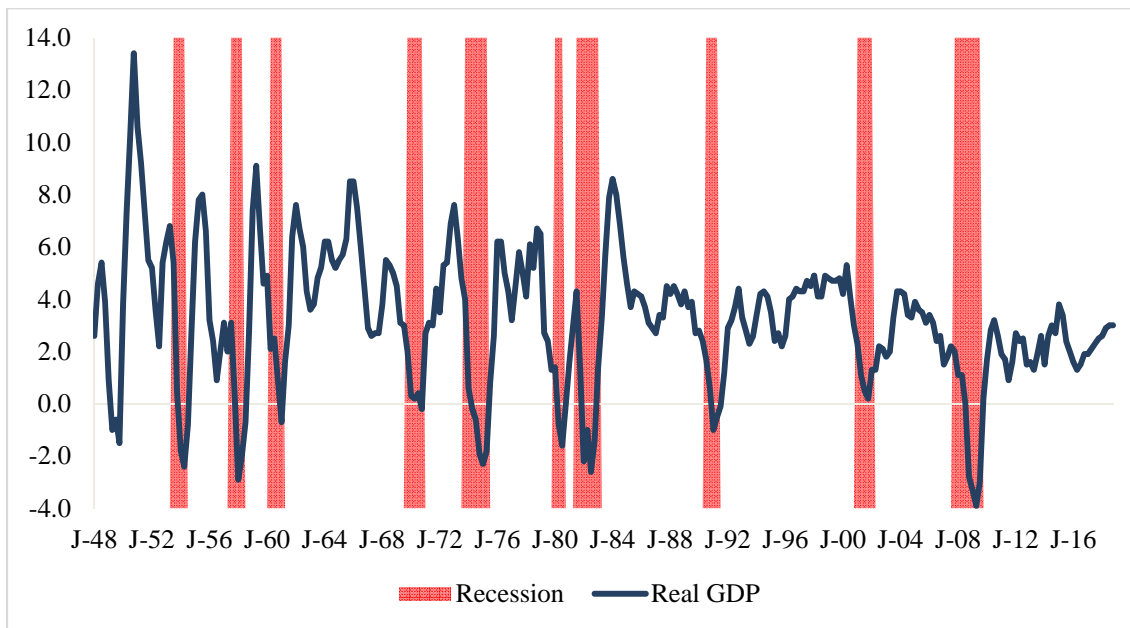


Perhaps there is a better metaphor for the business cycle using an aircraft carrier or oil tanker. Assume that the aircraft carrier is entering a fog bank and that there may be obstacles lying within the fog bank, such as icebergs. The captain will use the radar and other technical devices to plot the future path of the ship. Even after an iceberg is spotted, it takes a small lag before the rudder is turned (presumably not very long) but a much longer lag before the aircraft carrier moves from its previous path (the Titanic comes to mind, although the lookouts did not

have the luxury of a radar). Sometimes it gets worse as when Captain Joseph Hazelwood of the Exxon Valdez oil tanker did not have radar and his vision may have been clouded otherwise. Still the officers acknowledged a problem ahead (the reef), but could not turn the tanker around in time. Similar to the Exxon Valdez, the U.S. economy has a turn circumference that is very long.

Figure 3 shows what the business cycle, here represented by real GDP growth, looks like in real life for the post World War II period in the U.S. The shaded areas indicate recessions as defined by the NBER.

Figure 3: Real GDP Growth from a Year ago, U.S., 1947Q1-2018Q3, Quarterly Data



The purpose of this paper is to produce a fact check on a few of the typical statements that have been made in the popular press regarding the relationship between some of the leading economic indicators and the onset of the next recession in the near future. The next section looks at various claims made with respect to the signal we can extract from financial leading economic indicators (stock market, yield curve). This is followed by our forecast of GDP growth over the next few years. A final section concludes.

2. CLAIMS AND FACT CHECKS

In August 2018, *Fortune* Magazine ran a title story on the state of the U.S. economy, “The End is Near.”⁵ In the article, Golvin, a senior editor, makes a series of claims to support his vision of an imminent recession. Two months later, the cover of *The Economist* magazine suggests that the U.S. economy has reached a peak but there may be a flat section on the top of the mountain before the decline begins. While *The Economist* is more concerned with the lack of policy tools available during the next recession, it is also more cautious regarding the onset of the downturn.⁶ Regardless, there seems to be a Zeitgeist circulating that the 12th post-World War II recession is around the corner.

While a cynic might claim that these are just clever marketing tools to increase the sale of a magazine issue, we will look at some of the claims made by Golvin and others of a recession starting in the near future and provide fact checks. Specifically we will address the following statements: (A) the expansion is likely to end soon; (B) economists are not good at forecasting recessions; (C) the flattening of the yield curve suggests a recession in the near future; (D) stock market behavior is a reliable indicator of a future contraction; (E) the Index of Leading Economic Indicators should be used to forecast recessions.

2.A. ECONOMIC EXPANSIONS DIE OF OLD AGE

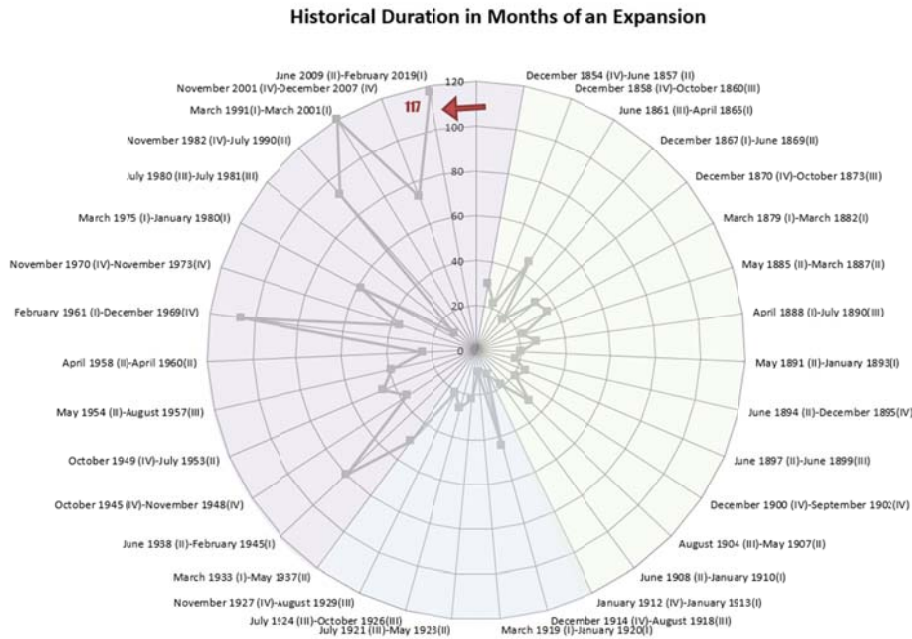
The current economic expansion started in July 2009 and has lasted 117 months so far. Figure 4 shows all U.S. expansions since December 1854. There has been only been one post-World War II upswing that has lasted longer, a 120 months period from March 1991 to March 2001. The

⁵ “The U.S. Economy Will Slow.” *Fortune* Magazine, August 2018.

⁶ “The Next Recession: How Bad Will It Be?” *The Economist*, October 11, 2018

economy will set a new U.S. post World War II record if the expansion continues beyond June 2019.

Figure 4: Historical Duration of Economic Expansions, U.S. in Months



Golvin makes the following statement regarding the length of the trough to peak phase we are experiencing. “The current economic expansion is much nearer its end than its beginning.” This is bound to be true: most likely, we will not see another 9 or 10 years of an uninterrupted boom in the national economy. Unfortunately this does not pin down the end date of the good times with any accuracy: Australia set a new record for the longest economic expansion among the Organization of Economic Corporation and Development (OECD) countries (in essence, a rich country club) in 2017 at 104 quarters (not months) – 110 quarters by now. The country experienced its last recession in 1991, or 28 years ago. *The Economist* found the record setting event sufficiently remarkable to run a title story on it last year.⁷ After all, the

⁷ “Aussie Rules: What Australia Can Teach the World.” *The Economist*. October 27, 2018.

Australian economy weathered the Asian Financial Crisis of 1997-8, the dot-com slump at the turn of the Millennium, and finally the Great Recession of 2007-9.

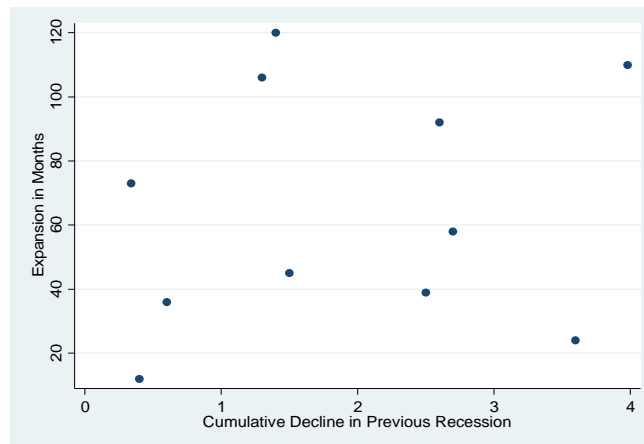
Is there anything we can learn from the Australian expansion with regard to extending the current boom? There are two relevant attributes that make Australia different from the U.S. First there is its immigration policy, which, while based on a point system, has encouraged foreigners to enter the country to the extent that 20% of the 25 million residents of Australia were not born in the country. This has resulted in a higher growth rate of the population and the labor force, and it is one explanatory factor for the long expansion: a one-percentage point difference in population growth may just have been sufficient to keep GDP growth in positive territory when growth was less than one percent. Second, raw material exports may have been a savior. Asking an Australian colleague about the causes of the long expansion in Australia, he replied “Dig it up and sell it to the Chinese.” This is not a sustainable strategy and one that is unavailable to most advanced countries. It seems to us that Australia is riding its luck and offers few macroeconomic lessons for others to draw upon.

There is one factor that is less obvious when comparing the two expansions only: what did the period prior to the last recession look like in the two countries? As it turns out, Australia experienced its financial crisis just before the last recession in 1991, which was particularly severe. In Australia, Black Monday is known as Black Tuesday – after all, Australia is 19 hours ahead of Cupertino time – and it saw its stock market decline by 40% (in the U.S., stock prices fell by roughly 20%). Moreover, two of the five largest Australian banks – State Bank of Victoria, State Bank of Southern Australia - collapsed and had to be bailed out by the government. The nation had just experienced a period of financial deregulation, in which the government eliminated interest controls on banks, allowed foreign banks to enter the market, and

floated the exchange rate.⁸ The subsequent recession was quite severe in Australia. To indicate the gravity, note that Australia experienced unemployment rates of 10.5% in 1992, and 11% in 1993 and 1994.

This observation suggests, perhaps, that a recession from a financial crisis, rather than from a monetary contraction/oil price increases, may be (i) more severe, and (ii) result in a longer expansion. Unfortunately you would have to analyze many historical episodes before you can draw parallels, and this is beyond the scope of this paper (on this, see Reinhart and Rogoff, 2009). However, there is a resulting hypothesis that can be tested, namely that the length of the subsequent recovery is related to the severity of the recession prior to it. Figure 5 plots the relationship between cumulative GDP decline for the previous recession and the subsequent length of the recovery.

Figure 5: Severity of Recession and Length of Subsequent Recovery, U.S., post-WWII



As you can see, there is no simple relationship between the two variables. The observation in the northeast corner is the Great Recession and the Not So Great (weak) Recovery (2009-2019). Sometimes a long expansion, such as the current one, follows a particularly severe recession; at

⁸ “Australia’s Experience with Financial Deregulation.” Speech at the Address to China Australia Governance Program, Melbourne, July 16, 2007. <https://www.rba.gov.au/speeches/2007/sp-dg-160707.html>.

other times a mild recession, such as the one experienced at the end of the Cold War, coincides with a very long expansion.

The bottom line, there is nothing there for us to exploit in terms of predicting the end of the current expansion: these episodes do not die of old age – although another economic downturn is just a matter of time... In the words of the former Federal Reserve Chairperson Janet Yellen during her February 11, 2016 testimony on Capitol Hill: “There is always some chance of recession in any year. But the evidence suggests that expansions don’t die of old age.”

2.B. ECONOMIST AS FORECASTERS OF RECESSION

Fortune Magazine is particularly harsh on economists with regard to forecasting recessions. “In addition to knowing which indicators are best at predicting recessions, we also know whom not to ask: economists. At least on this task, they’re terrible.” Sadly the statement is mostly true. For example, surveying 47 professional forecasters at Goldman Sachs, Barclays, JP Morgan, Mitsubishi, etc. in August 2008 when we were already more than seven months into the recession and Bear Stearns had failed earlier that year, the median forecast for 2008:IV was (plus) 0.7% when it turned out to be -8.5%.⁹ While the Lehman Brothers debacle did not occur until mid-September 2008, and the NBER, through its business cycle dating committee, did not declare the start of the recession until December 2008, when December 2007 was designated as the official beginning of the downturn,¹⁰ a forecast error of this magnitude is remarkable. The

⁹ Federal Reserve Bank of Philadelphia. “Annualized Percentage Change in Mean Responses – Real GDP Growth.” *Survey of Professional Forecasters*, <https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/data-files/rgdp>

¹⁰ To be fair, it is not true that the dating committee was not aware of the downturn until December 2008. Instead the dating committee wants to set an exact date (month) for the start of the recession, and it waited with that announcement until its analysis more clearly showed the start in December 2007; the dating committee has not changed starting dates of recessions once they are set.

consensus opinion in early to mid-2008 was that we were facing a minor banking problem, perhaps a regional recession, and so on.

What do these professional economists tell us these days? According to a survey by the Wall Street Journal in May of 2018, almost 60% of the respondents (business, financial, and academic economists) saw the expansion ending in 2020. By 2021 that percentage increases to over 80%.¹¹ We therefore find ourselves in a different situation from previous recessions: the vast majority of professional economists forecasts a significant slowdown within the next two years. If you want to convince others about an oncoming recession while suggesting that economists are notoriously doing a poor job forecasting recessions, then this is not the time to do so.

2.C. THE YIELD CURVE AS A PREDICTOR OF RECESSIONS

Now that we have established a fairly strong consensus between the popular press and both academic and business/finance economists of an oncoming recession, the question must be regarding the radar that these experts are using. *Fortune* magazine claims that “when the yield on long-term (10-year) Treasury securities falls below the yield on short-term (3-month) Treasuries – an inversion of the yield curve – a recession is on the way.”

There are a variety of reasons why short term interest rates may be higher than long term interest rates: the Federal Reserve could use monetary policy to tighten credit markets, or the general outlook on the economy could lower long term interest rates as a result of a belief of lower economic activity in the future (see, *inter alia*, Andolfatto and Spiewak, 2018).

¹¹ “Economists Think the Next U.S. Recession Could Begin in 2020, May 10, 2018, Wall Street Journal.
<https://www.wsj.com/articles/economists-think-the-next-u-s-recession-could-begin-in-2020-1525961127>

Figure 6a shows both the long term (10-Year) interest rate and the short term (3-Month) interest rate. The difference between the two is called the “yield curve” or “term spread” (Figure 6b). The popularity of the yield curve in forecasting recessions stems from the fact that since 1970, or for the last seven episodes of a downturn, an inversion has preceded a decline in economic activity (see, e.g. Kliesen (2018)). The average lag between the yield curve becoming inverted and the beginning of the subsequent collapse, has been slightly over 10 months. However, this average hides a fairly large variation from a minimum of five months (June 1973) to a maximum of 16 months (August 2006). A good overview of the empirical literature on this is given by Wheelock and Wohar (2009).

The yield curve has become consistently flatter since 2014, and it finally inverted, quite unexpectedly, on March 22, 2019. It remained inverted for five days, before the long term interest rate ended up higher than the short term rate. We don't take a 5-day inversion as a sufficiently strong signal for a sustained inversion. If we did, and assuming that the average lag between the inversion and the onset of the recession follows historical patterns, we would forecast the start of the recession to be in 2020:Q1. Note that it took as long as 16 months, or over a year and a quarter, for the negative term spread to result in a downturn in the past, which would get us to the middle of 2020.

It will also be interesting to see how the Federal Reserve will react if such an inversion became sustained. The Fed has already taken off two previously forecasted federal funds rate increases in 2019. Following President Trump's policy advice, it could lower the federal funds rate, or return to purchasing long-term bonds again (thereby increasing their price and lowering the long-term interest rate). As of now, it has suspended the reduction in the balance sheet through letting long-term bonds mature without replacing them. The Federal Reserve did oversee

an inversion of the term spread in the past, but typically this happened as a result of the central bank wanting to generate a monetary contraction to fight inflation. However, inflation does not pose a problem at this point, with price increases (measured through personal consumption expenditures, not the consumer price index) close to, but still below, the target set by the central bank.

Figure 6a: Short-Term and Long-Term Interest Rates, U.S., 1955-2019

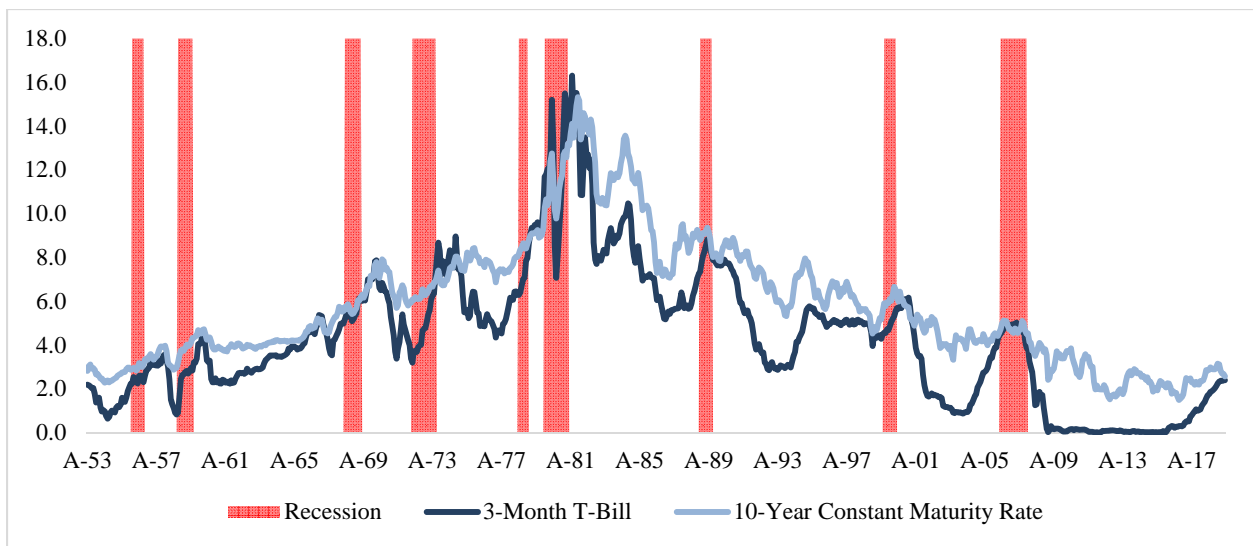
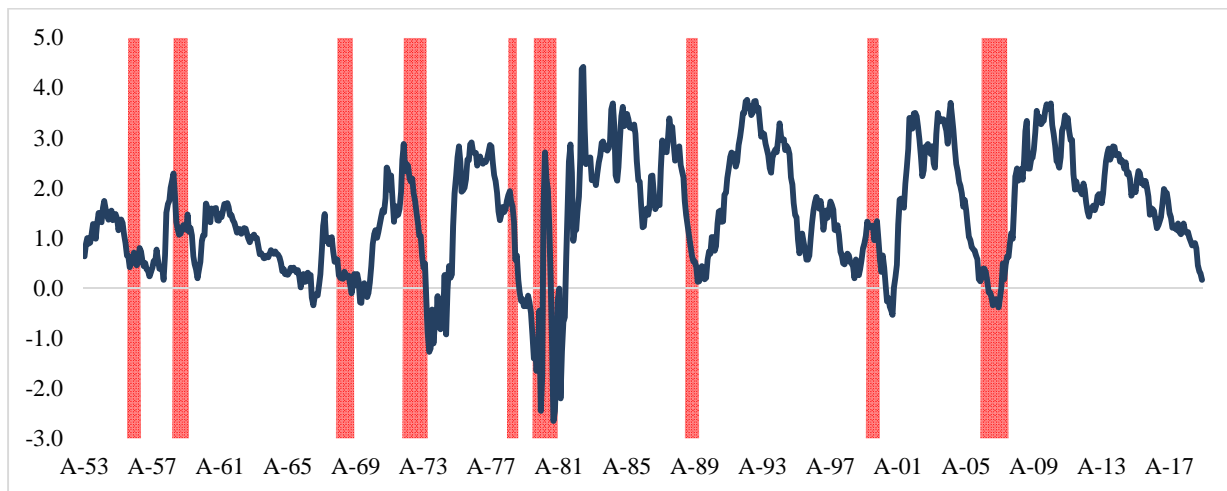


Figure 6b: Yield Curve, U.S., 1982-2019

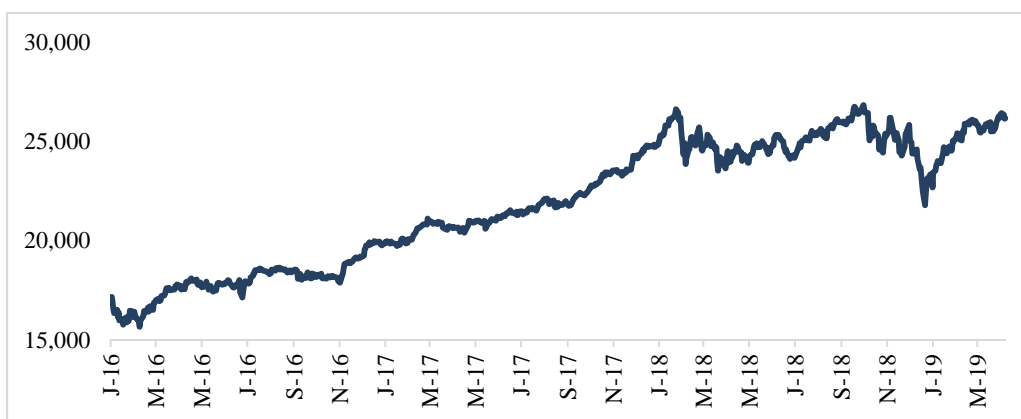


One final note on the interest rate spread: the Index of Leading Economic Indicators constructed by the Conference Board contains the difference between the 10-Year Treasury Bond minus the Federal Funds Rate, not the 3-Months Treasury Bill. Plotting that difference, we see a three-day inversion of the yield curve (March 27-29). However, to weigh in negatively on the LEI, all that is required is a reduction in the yield curve, and that certainly has happened.

2E. STOCK MARKET BEHAVIOR AS A LEADING ECONOMIC INDICATOR

Another leading economic indicator for a recession is the stock market, and analysts have paid particular attention to it after the post-election 2016 market boom was interrupted in February 2018. Since then the stock market has exhibited relatively large, sometimes high frequency, swings (see Figure 8a). However, despite the recent pessimistic outlook, the Dow Jones Industrial Average (DJIA) is only about 400 points or about 1.5% below its all-time peak as we write. The more inclusive S&P 500 has seen the largest quarterly gain in 2019:Q1 since the end of the Great Recession (see Figure 8b).

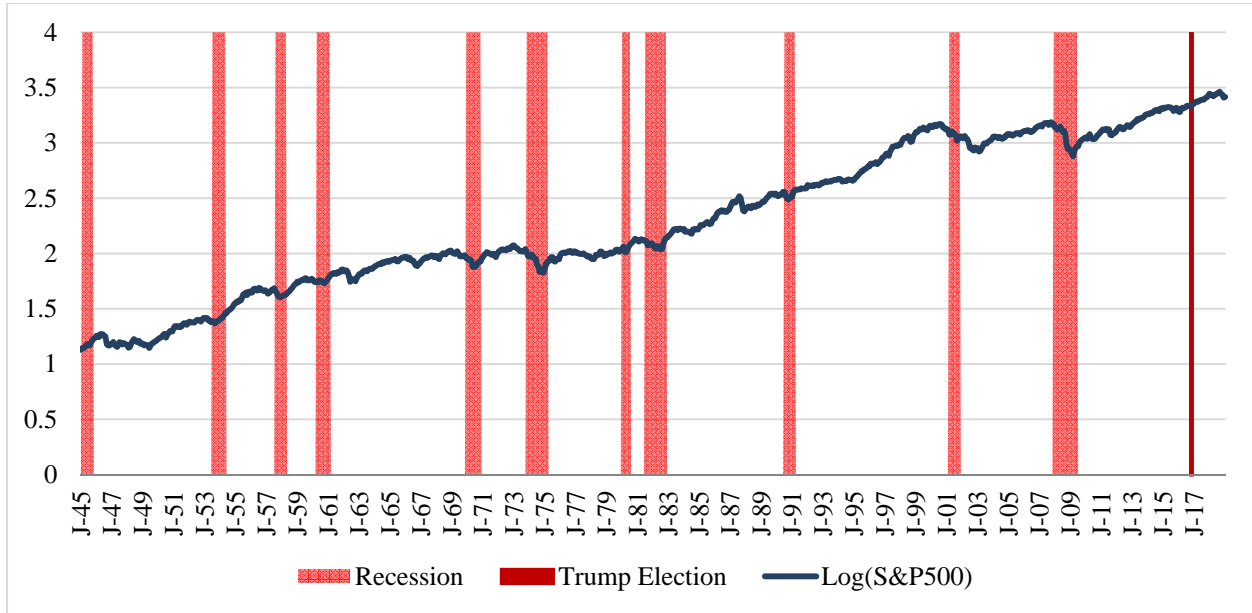
Figure 8a: Dow Jones Industrial Average, November 8, 2016 – April 10, 2019



One reason for the stock market's popularity in forecasting recessions stems from the fact that stock prices are forward looking in that they take into account future earnings of companies.

Also, the stock market has forecasted every economic downturn after World War II. However, as remarked by Paul Samuelson, regarded by many as the father of modern economics, in 1966, bear markets have predicted 9 of the last 5 recessions. CNBC, in February 2016, updated that statement to “stock markets have predicted 13 of the last 7 recessions.”

Figure 8b: S&P 500 Index (logarithm scale), U.S., Monthly Averages, 1945:M8-2019:M3



Note: dark red bar indicates Presidential Election 2016.

Taking a longer term view rather than focusing on the behavior since February 2018, the stock market recently experienced the longest expansionary period on record, a run that started in March 2009. The financial sector defines an expansionary period in the stock market as a bull market that exceeds 20% growth and does not fall in the process by 20% or more. The recent dramatic declines from January 26 to February 9 of 2018, and October 3 to December 21 of 2018 saw the S&P 500 fall by 8.8% and 17.4% respectively. There is some debate whether or not the expansion actually is record breaking, but that is of little concern for our discussion here.

Given the behavior of the more general stock market index in Figure 8b, it is actually not trivial to define a measure of stock price decline that would signal a downturn. After

experimenting with different categorizations, we settled on a significant stock market decline for our purpose as a negative growth for three or more consecutive quarters. Using this criterion, we find five “false positives since 1959” (see Table 1). The recent declines were from 2018:Q1 to 2018:Q2, followed by an increase to 2018:Q3 and another decrease to 2019:Q4: the stock market decreased two out of three quarters, not three quarters in a row. While this is a “close call,” there seems to be another positive quarter on the way. Furthermore, a decline of two out of three quarters is not unusual for the index: the same pattern occurred from 2015:Q2 to 2016:Q1 (negative, positive, negative) with a subsequent prolonged increase.

Table 1: Significant Stock Market Decline and Subsequent Economic Recession, 1959 - 2018

Date	Decline in Stock Prices	Subsequent Recession
1959 Q4 - 1960 Q4	-4.2%	April 1960 - February 1961
1962 Q1 - 1962 Q3	-17.3%	None
1966 Q1 - 1966 Q4	-13.0%	None
1969 Q3 - 1970 Q3	-16.6%	Dec 1969 - November 1970
1973 Q2 - 1974 Q4	-35.4%	November 1973 - March 1975
1976 Q4 - 1978 Q1	-12.9%	None
1980 Q1 - 1980 Q2*	-1.7%	January 1980 - July 1980
1981 Q1 - 1982 Q3**	-13.5%	July 1981 - November 1982
1990 Q1 - 1990 Q4***	-5.7%	July 1990 - March 1991
2000 Q4 - 2001 Q4	-18.2%	March 2001 - November 2001
2002 Q2 - 2003 Q1	-19.5%	None
2007 Q2 - 2009 Q1****	-45.7%	December 2007 - June 2009
2011 Q2 - 2011 Q4	-7.1%	None

Notes: *Only one quarter of falling prices.**1981 Q2 saw .96% positive growth. ***1990 Q2 saw 4% positive growth. **** 2007 Q4 had a .21% positive growth and 2008 Q2 had a 1.6% positive growth

2G. THE INDEX OF LEADING ECONOMIC INDICATORS

Rather than looking at one indicator at a time, why not combine several of them into a single index?¹² This is exactly what the Conference Board's ILE does. Originally developed at the NBER, the Conference Board eventually purchased the index in 1996. In essence, it is a weighted average ("composite index") of 10 underlying economic series.¹³

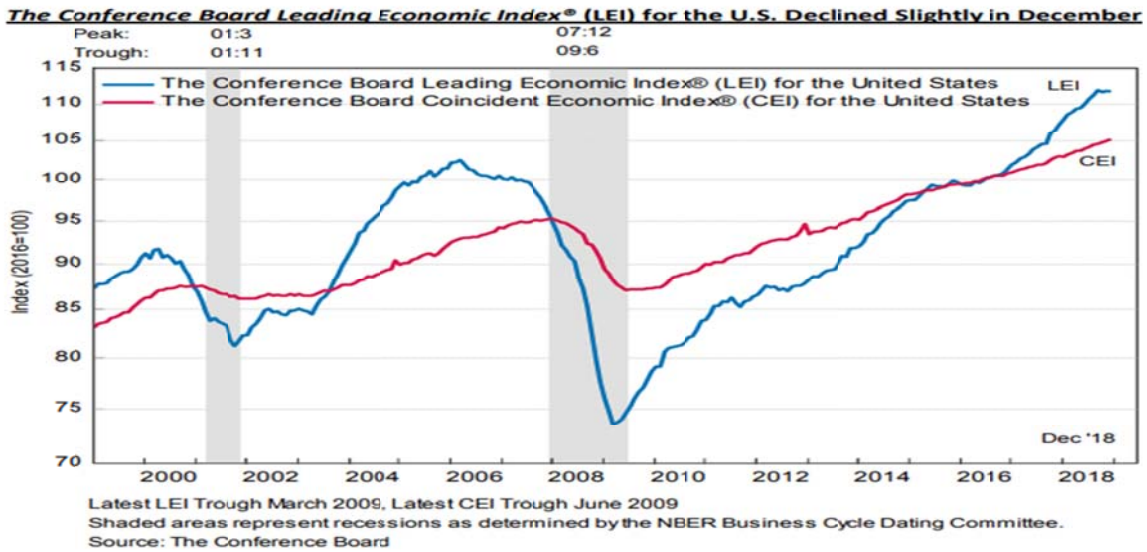
Taking an average of various series has the advantage that extremes cancel each other. Also, it takes several series to send a negative signal before the ILE shows negative growth. We have already looked at the first two components in more detail above. Technically the index weighs the components depending on their variability (fewer fluctuations in a series result in a higher weight), and it is then adjusted to historical real GDP growth patterns. It is not clear why a series with lower variability should receive a higher weight. Leamer (2007), for example, stresses that housing starts are a superior indicator of future downturns in an economy. Figure 9 displays the LEI together with the CEI since 1998.

The ILE becomes a very good forecaster for future recessions if you focus on periods when it turned down for three months in a row. Most often, a recession then started within the next six months. In the Appendix, we compare the accuracy of the ILE in forecasting recessions with that of the yield curve and find it to perform significantly better.

¹² "But as with all recession signals, the wise economic analysts should examine many indicators rather than betting the farm on one or two." *On the Economy*, Federal Reserve Bank of St. Louis, August 2018.

¹³ Stock prices, interest rate spread (10-Year Treasury vs. Federal Funds Rate target), average consumer expectations for business conditions, average weekly manufacturing hours, average weekly initial claims for unemployment insurance, manufacturer's new orders for consumer goods and materials, new orders index (Institute for Supply Management), manufacturers' new orders for nondefense capital goods excluding aircraft, building permits, leading credit index.

Figure 9: The Conference Board Leading Economic Index and Coincident Economic Index, U.S., 1998-2018



. Table 2 shows that there were only two false positives if you follow that rule since 1959, a superior record when compared to the forecasting ability of the stock market.

What is the most recent behavior of the LEI? The index fell slightly for the first time in October 2018, basically gained back the loss in November 2018, before declining again in December 2018. It remained constant for January 2019 before improving slightly for February. The bottom line is that the index fell two out of the last three months, but it did not fall three months in a row, which we would have taken as a strong signal for a recession within the next six months.

Table 2: Periods of 3-month Declines in the LEI and Subsequent Recession Dates

Date	Decline in LEI	Subsequent Recession
July 1959 - October 1959	None	April 1960 - February 1961
April 1966 - July 1966	0.8%	None
April 1969 - July 1969	1.8%	December 1969 - November 1970
May 1973 - August 1973	1.8%	November 1973 - March 1975
May 1979 - August 1979	1.8%	January 1980 - July 1980
November 1980 - February 1981	2.5%	July 1981 - November 1982
June 1990 - September 1990	2.9%	July 1990 - March 1991
September 2000 - December 2000	3.2%	March 2001 - November 2001
March 2006 - June 2006	1.3%	None
May 2007 - August 2007	0.9%	December 2007 - June 2009

3. REAL GDP GROWTH RATE FORECAST

If you believe that the inversion of the yield curve is a reliable predictor of an imminent recession, then the crucial question is when you expect the interest rate differential to become negative on a more consistent (say a month or a quarter) basis. There is a variety of methods that can be used for this. One possibility is to specify a VAR model of real GDP growth and term spread.

Taking into account the forecast from that system and other methods, the bottom line is that we do not see a recession for 2019 and 2020. Hence we do not agree with the 60% of surveyed professional economists. Even if the yield curve inverted again later this spring, which we continue to find unlikely, then it will take on average 10 months for a recession to start, taking us into early 2020. We see a low growth rate in real GDP for 2021, but would not dare to forecast two years into the future, even if we had predicted a negative growth rate for 2021, which, again we stress, we did not.

4. CONCLUSION

One way to read our analysis is to suggest that we are more optimistic about the economic outlook than other analysts. However, recent developments in the stock market and the yield curve have also had the effect of making us reflect more carefully about the state of the business cycle in the U.S. Housing data and automobile sales certainly look weaker now than only a short while ago, and there will be a decline in the growth of government spending in 2019. If you couple that with a likely decline in the growth of investment, a reduction in inventory investment which is the result of a previous build-up in inventories in anticipation of tariffs, demographics that do not contribute to continued growth, and the potential chaos in D.C. over the next two years, then there are certainly scenarios under which the economy could turn south. We can add to that external effects such as Brexit, potential debt crisis in Turkey, Italy, and Argentina, plus debt problems in lesser developed countries due to the effect of an appreciating dollar on dollar denominated debt, and there are scenarios which would be conducive to an overall economic downturn, if not at least a significant slowdown to below a 1% growth over the next two years. Once growth is at such low levels, then a minor shock can turn the record setting expansion into a recession. Putting it differently, when there are low real GDP growth rates, it is more likely that

a negative shock can result in a recession. This is the same conclusion as reached by many forecasters (see, e.g., Andolfatto and Spewak (2018)). Shocks, on the other hand, cannot be predicted (otherwise they would not be called “shocks”) and we are certainly not in the business of unanticipated future events.

Appendix

To get a better understanding of the relationship and the timing issues, we performed a logit regression using quarterly data to assess the past performance of the yield curve and the LEI in forecasting recessions. For the LHS variable, we created a binary variable that took the value of 1 if there was going to be a recession during the subsequent one to four quarters ahead (*nber1_4*), or basically within a year. This approach is similar to Leamer (2009, Ch. 13).¹⁴ The idea here is to forecast the start of a recession, not its end. The single explanatory variable is the yield curve. The result was as follows:¹⁵

$$\widehat{nber1_4}_t = 0.54 - 1.40 \times yieldcurve_t$$

(0.30) (0.27)
[-1.92, -0.88]

$t = 1973:I - 2018:II, \text{Pseudo } R^2 = 0.34$

Using the estimated equation, we can calculate probabilities associated with an oncoming recession. Judging observations from the past, we feel that you have to be about 60% certain regarding a future recession for it to materialize with a high degree of certainty. For this to happen, the yield curve would have to be -0.04 percentage points on average for a quarter.

A similar regression for the ILE, confirms the impression from Table 2 in the text. The fit is substantially improved from the previous regression. We chose the growth rate of the LEI rather than the level since the LEI is not stationary (its growth rate is artificially linked to the growth rate of real GDP). The sign indicates that a decrease in the LEI increases the probability of a recession within the following year - as does a sustained (three months) lower level of the index.

¹⁴ Leamer uses monthly data, with the LHS variable taking on a value of 1 during the year before the onset of a recession.

¹⁵ Numbers in parenthesis are heteroskedasticity robust standard errors, numbers in brackets are 95% confidence intervals for the slope.

$$\widehat{nber1_4}_t = -1.83 - 1.24\Delta \ln(LEI)_t + 2.10 \times DUM3M_t$$

(0.34) (0.40) (0.71)

[-0.40, -2.20]

$t = 1973:Q1-2018:Q3$, Pseudo- $R^2 = 0.57$

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