

Global macro matters

Known unknowns: Uncertainty, volatility and the odds of recession

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Even as the financial markets have rallied in early 2019, recession concerns have dominated investor discussions. We continue to believe that the US economy will avoid recession this year, consistent with our annual outlook, *Vanguard Economic and Market Outlook for 2019: Down but Not Out*. However, economic policy uncertainty increased and financial conditions tightened significantly in late 2018 and early 2019, although in February both measures rebounded modestly. At the height of increased volatility and economic policy uncertainty, we had increased our estimated probability of recession to 35%. In this note, we explore the extent to which these twin risks are expected to spill over to the real economy and how this impacts our outlook for the US Federal Reserve actions.

The US economy will bend, not break ... again

In our *Economic and Market Outlook for 2019*, we stated that US economic growth would decelerate gradually toward 2% this year as the benefits of

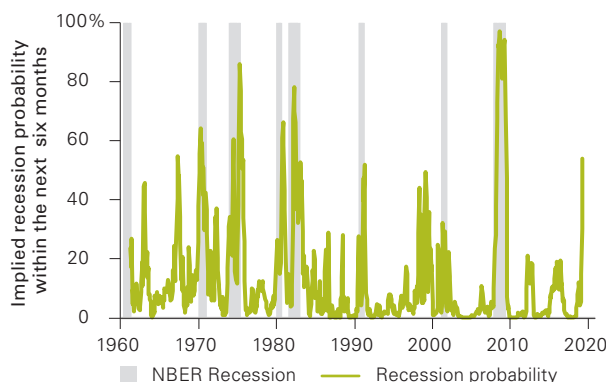
expansionary fiscal and monetary policy abate. However, given the sharp tightening in financial conditions and elevated economic policy uncertainty at the beginning of the year, and cautionary signals from leading economic indicators, our base case is now an expectation that growth will decelerate more quickly toward 2% than previously anticipated.

Predicting recessions with precision has proven a challenging exercise for even the most successful economic forecasters. This is why we approach such projections as we do all forecasts, with humility and within a probabilistic framework that acknowledges the risks of being wrong.

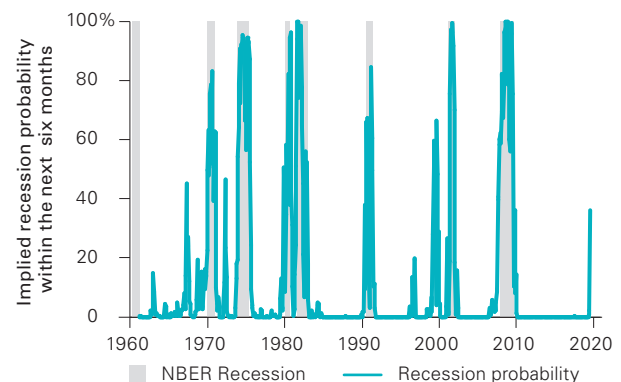
In our view, the most useful estimates of the probability of recession incorporate economic as well as financial market variables. **Figure 1** shows the likelihood that the US economy would be in recession (from the January peak in financial tightness and uncertainty levels) in the next six months using two

Figure 1. Recession probability models at January 2019's peak financial market stress points

a. Recession probability using only financial market data



b. Recession probabilities tempered when economic data is incorporated



Notes: In the first chart, the implied recession probability has been derived using a probit regression model that uses the Vanguard Financial Conditions Index (VFCI) as input. In the second chart, the probit regression model uses the Vanguard Financial Conditions Index (VFCI) and the Vanguard Leading Economic Indicators (VLEI) as inputs. Both models have been estimated using monthly data from July 1960 to December 2018. A dummy variable has been included for both models, which is denoted 1 from July 1960 to December 1984 and 0 from January 1985 to December 2018 to account for an economic regime change.

Sources: Vanguard calculations based on data from the Federal Reserve Bank of St. Louis, Moody's Data Buffet, Moody's Investors Service, the National Bureau of Economic Research (NBER), Standard & Poors, Thomson Reuters Datastream, and the US Board of Governors of the Federal Reserve System (FRB).

models – the first incorporates only financial market variables and the second includes a more comprehensive set of financial market and macroeconomic variables. The latter is our preferred model.

Historically, US recessions have occurred about once every five years, according to the National Bureau of Economic Research (NBER). Therefore, a baseline probability of recession in any given year would be around 20%. According to our model that includes just financial market variables,¹ the implied recession probability today is about 54%.

However, recession probability estimates based solely on financial market variables are more volatile and have proven less reliable than estimates that include a wider set of financial market and economic variables (see Figure 1a). Our preferred model points to a lower recession probability of around 35%, while the model's explanatory power (as measured by R-squared)² increases from 0.18 to 0.65.

Twin risks: Financial conditions and policy uncertainty

Tighter financial conditions, as measured by the Vanguard Financial Conditions Index (VFCI), pose a risk to economic growth because they increase the cost of borrowing for households and firms and dampen confidence. (The VFCI is a dynamically weighted index of 12 financial variables designed to capture overall financial conditions.) **Figure 2a** shows that the last two US recessions have been accompanied by a tightening in financial conditions.

An additional risk to economic growth today is the elevated level of economic policy uncertainty (**Figure 2b**). We use the Economic Policy Uncertainty (EPU) Index³ to explore the relationship between uncertainty and economic fundamentals. This index provides a real-time measure of policy uncertainty in the economy by incorporating a variety of factors such as tax policy, spending policy, monetary policy, and government shutdowns. Figure 2b shows how this index has evolved over time. We have also added two forecasts: The first is our baseline scenario, where we anticipate policy uncertainty will revert to the 2018 average; and the second is our worst-case scenario, where policy uncertainty remains elevated.

The correlation between the two indices (~0.30) reveals that they can stray from each other, although in late 2018, the indices moved together, with a sharp rise in policy uncertainty coinciding with a significant tightening of financial conditions. The partial US government shutdown and trade tensions pushed policy uncertainty to levels not seen in several years and the Vanguard Financial Conditions Index followed suit, with equity market volatility and widening fixed income spreads responsible for most of the tightening.

What a drag: The economic implications of uncertainty and volatility

In assessing the impacts of high economic policy uncertainty and tight financial conditions, we have isolated changes to growth driven by these two factors. We built a Vector Auto Regression (VAR) model, which helps us calculate drags for different scenarios (see Notes for **Figure 3**). Using this method, we are able to estimate the impact that elevated uncertainty has on economic fundamentals and, in turn, project the impact a given level of uncertainty will have should it persist for some specified amount of time. We then followed a similar approach in assessing the implications of tight financial market conditions.

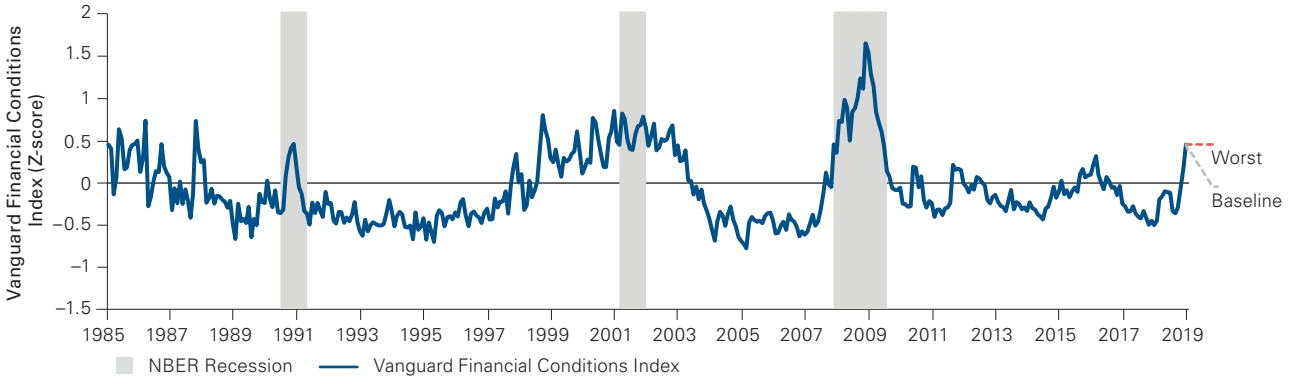
¹ This probit regression model includes the Vanguard Financial Conditions Index (VFCI) as an input.

² R-squared is a statistical measure that represents the proportion of the variance-dependent variable explained by independent variables in the regression model.

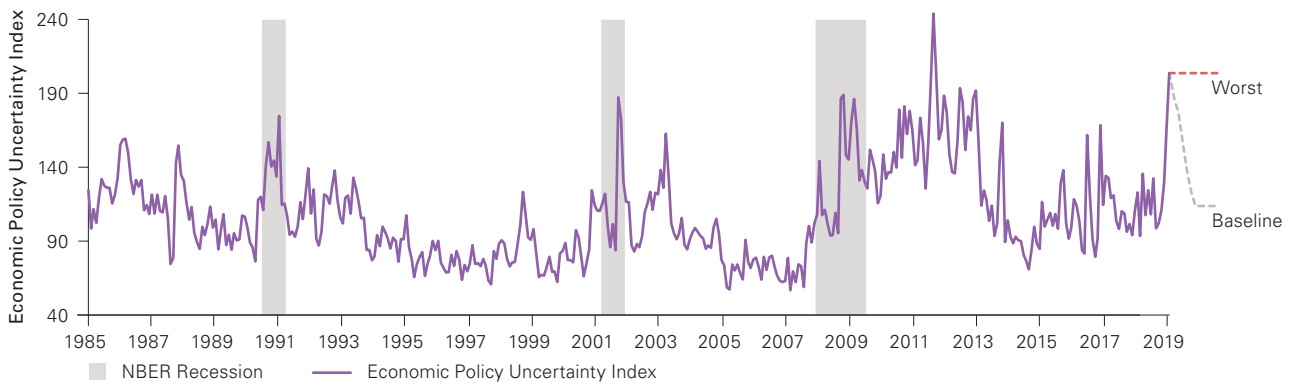
³ Data and methodology publicly available at <http://www.policyuncertainty.com/>.

Figure 2. Key conditions under the microscope: Financial conditions and economic policy uncertainty

a. Financial conditions tightened significantly toward the end of 2018



b. An uncertain and volatile end to 2018



Notes: The Vanguard Financial Conditions Index is a dynamically weighted index of 12 financial variables designed to capture overall financial conditions. Recessions are as defined by NBER.

Sources: www.policyuncertainty.com, Thomson Reuters Datastream, the St. Louis Federal Reserve Database, and NBER.

Figure 3 illustrates our results. Clearly, economic policy uncertainty can be a large drag on economic fundamentals – even more so than financial conditions. Indeed, if policy uncertainty persists for an extended period, the “uncertainty tax” on economic fundamentals increases and the disparity between the impact of uncertainty and of financial market conditions widens. Financial markets hate uncertainty, but so do the investors, business leaders, and hiring managers who influence the economy.

Also clear from Figure 3 is that the impact of a sharp rise in uncertainty and tighter financial market conditions tends to persist over time. In all instances, economic fundamentals never experience a rebound that completely offsets the initial drag of the shocks such that the average impact over the course of the year is

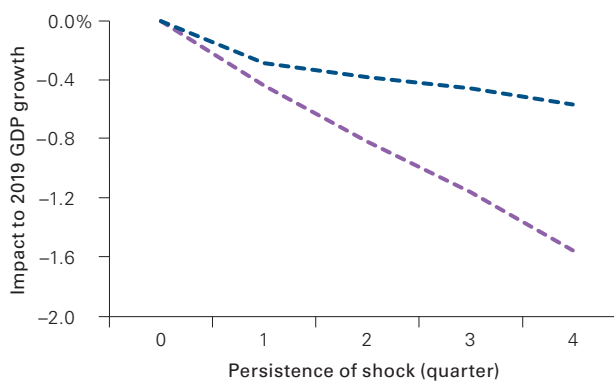
negative even if the shocks dissipate after one quarter.⁴ This can be largely attributed to some degree of permanence in effect from the shock, such as uncompleted business that cannot be regained or forgone consumption.

Our base case is for policy uncertainty and financial conditions to fall back to more normal levels in the near term, similar to those experienced during the first three quarters of 2018. But our analysis shows that any drag is unlikely to be offset by a rebound unless economic policy clarity increases more substantially and/or financial conditions ease considerably.

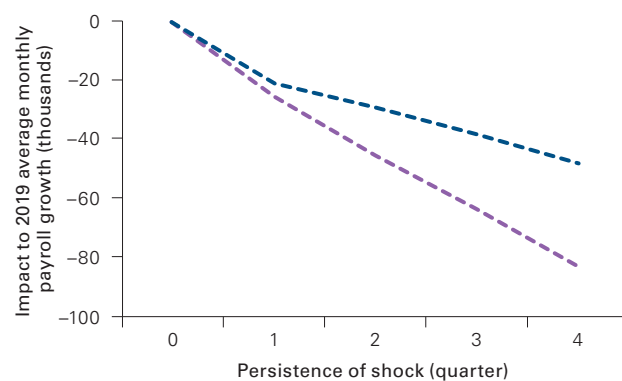
The economic drags created by policy uncertainty are by no means specific to the United States. We performed a similar analysis for China and the euro area.

Figure 3. The drag from higher uncertainty and tighter financial conditions on growth, labour market, and inflation

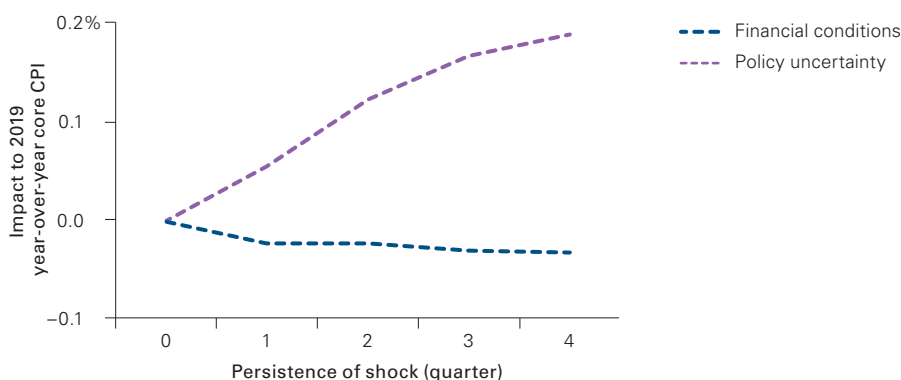
a. Impact on growth



b. Impact on job growth



c. Impact on inflation



Notes: The charts show the US gross domestic product (GDP), inflation, and job growth deviation from the base case if elevated policy uncertainty and tighter financial conditions persist for one to four quarters. Scenario simulations are based on Vector Auto Regressive (VAR) models, which include the Vanguard Leading Economic Index, the Vanguard Economic Momentum Index, and one of EPU or VFCI and one of GDP, non-farm payroll or core consumer price index.

Sources: Vanguard calculations based on data from www.policyuncertainty.com and Thomson Reuters Datastream.

⁴ The impact of a shock to economic policy uncertainty actually puts upward and increasing pressure on inflation as it persists, possibly because concerns over inflation typically centre on higher, not lower, inflation.

In China, financial conditions are relatively easy today, but the policy uncertainty index has never been higher. Consistent with the US experience, financial conditions in China take a back seat to policy uncertainty in their impacts on economic fundamentals.

However, the opposite is true in the euro area, where financial conditions have a greater impact than policy uncertainty. This is likely because of a stronger co-movement between euro-area financial conditions and the economic policies enacted by sovereign nations within the currency bloc.

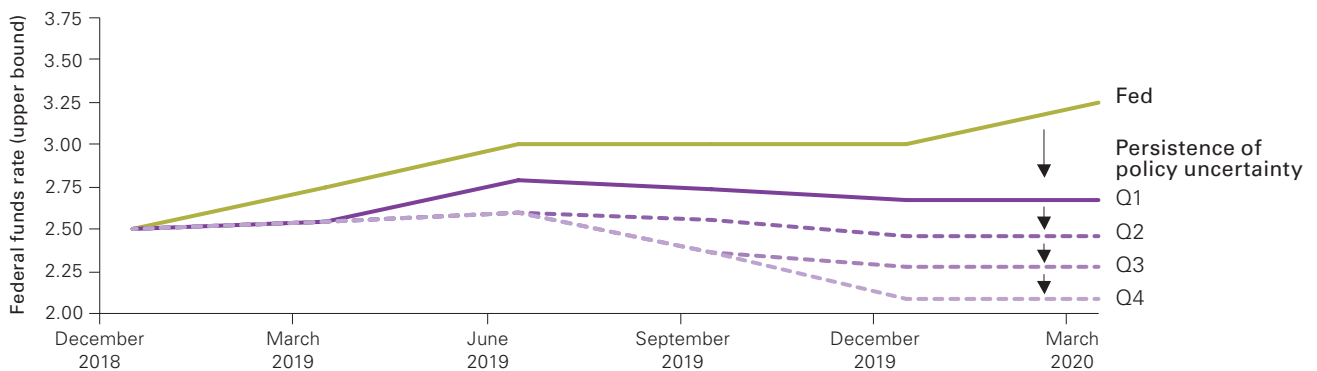
Policymakers take note

Our analysis of the impact of policy uncertainty and tighter financial conditions also has implications for our monetary policy view. **Figure 4** shows what happens

when we incorporate the drag on fundamentals from economic policy uncertainty into the FRB/US model,⁵ assuming the shocks persist for differing lengths of time.⁶ Comparing the solid purple line with the green line, we can see that the impact of policy uncertainty is consistent with removing one full hike from the Fed's intended policy normalisation path. We get similar results when we run an analysis of the implications of tighter financial conditions; they also suggest fewer hikes.

Were uncertainty to persist for two or more quarters, the two hikes the Fed has as its current base case each become less likely. Policy rate cuts become the central scenario should uncertainty persist for even longer. Financial market volatility alone would be unlikely to cause the Fed to deviate from its path, but combined with the drags from economic policy uncertainty, it is

Figure 4. Drags on fundamentals pulled down our Fed expectations



Note: Shocks to GDP growth and employment were input into the FRB/US model to assess their impact on the effective federal funds rate based on a Taylor rule.⁷

Sources: Vanguard calculations based on data from www.policyuncertainty.com, Thomson Reuters Datastream, the St. Louis Federal Reserve Database, and the Federal Reserve Board FRB/US model.

⁵ The FRB/US model is a large-scale estimated general equilibrium model of the US economy that has been in use at the Federal Reserve Board since 1996. The model is designed for detailed analysis of monetary and fiscal policies.

⁶ A similar analysis incorporating the impact of the drags from tighter financial market conditions showed similar though smaller impacts, such that a shock would have to persist for at least two quarters for Fed policy to eliminate a full rate hike.

⁷ Taylor's rule is a formula developed by Stanford economist John Taylor. It was designed to provide "recommendations" for how a central bank like the Federal Reserve should set short-term interest rates as economic conditions change to achieve both its short-run goal for stabilising the economy and its long-run goal for inflation.

hard to justify two Fed rate hikes in 2019. Given these results, we have formally changed our expectation from two Fed rate increases in 2019 to one.

A similar analysis of the implications of economic policy uncertainty and financial conditions in Europe lends support to our view that the first European Central Bank rate hike will be pushed from late 2019 to sometime in 2020. And in China, we expect that further easing by the People's Bank of China may be in store this year should uncertainty persist.

Conclusion

As we noted in our outlook for 2019, US and global economic conditions were likely to soften this year. Tighter financial conditions and heightened uncertainty have since led us to dial those expectations lower. We don't expect a recession, but the probability of a downturn has risen. We also anticipate ongoing spikes in volatility and uncertainty as policymakers and investors grapple with slowing growth and the continued normalisation of monetary policy.

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