THE TAMING OF THE BUSINESS CYCLE

Fewer recessions but weaker recoveries

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IN BRIEF

- The U.S. economy has become more stable over time. Analysis of the components of aggregate demand suggests that this is primarily due to smaller inventory cycles and less disruption from big swings in government spending and housing.
- The U.S. economy has gradually seen slower growth, along with increased stability. However, simulation models suggest that, in predicting the frequency of recession, diminished macro volatility is more important than diminished average growth. This in turn suggests that recessions should occur less frequently than in the past and be milder than the average historical experience. It also, however, implies that future recoveries will be less robust.
- Extending the analysis outside the U.S. generally yields the same prediction — fewer and smaller recessions but weaker recoveries over our forecast horizon.
- It should be noted that this growing stability in the macro economy provides no guarantee that the next financial market downturn will be similarly mild. How investors fare in such a downturn will depend on both its causes and how portfolios are positioned when the downturn begins. We examine this issue in "**Building investor resilience in a downturn.**"

INTRODUCTION

Our Long-Term Capital Market Assumptions are deliberately neutral with respect to the timing of business cycles. We recognize that within a 10- to 15-year forecast horizon, most economies will experience one or more recessions and that these recessions will impact the overall average pace of economic growth, inflation, interest rates and asset class returns. However, timing these recessions, particularly over such a long horizon, would be an overly ambitious goal, and in most cases subsequent recoveries will undo many of the impacts of the recessions themselves.

Still, we should not be blind to the changing nature of business cycles. Excluding the very deep global recession that was triggered by the global financial crisis, recessions have generally become milder and less frequent in recent decades, with correspondingly shallower recoveries. In this paper, we examine why this has been the case and what it implies for the cyclical behavior of economies in our forecast. We start with a brief review of the 11 post-World War II recessions in the U.S. This is followed by an examination of the causes of greater GDP stability and a simple model of recession dynamics, from which we derive probable U.S. recession frequency and depth over the next 15 years. We focus chiefly on the U.S., in part because of better historical data but also because U.S. recessions have often precipitated downturns overseas. We conclude with a brief look at some other economies' business cycles to determine common trends. In what has become a slower-growing but more stable global economy, we expect downturns to be less severe and recoveries less robust.

It is also important to recognize that while a milder business cycle could help reduce the size of financial market downturns, it provides no guarantee of this. This makes investor outcomes at least as dependent on portfolio positioning as macro stability. More broadly, outcomes will be driven by the impact of macro events on investors' wider circumstances and the impact of market events on their portfolios.

A BRIEF HISTORY OF U.S. POST-WORLD WAR II RECESSIONS

Massachusetts Institute of Technology economist Rudi Dornbusch famously remarked that postwar expansions "were all murdered by the Fed." That assessment is a bit of an exaggeration. Federal Reserve policy tightening has played a supporting role in triggering a few recessions, but tightening through prior expansions has largely been the appropriate response to accelerating demand, arguably leading to softer landings than would otherwise have occurred in overheating economies.[1]

Instead, the causes of U.S. recessions have been multifaceted and are not perfectly understood, even in hindsight. That said, each of the 11 postwar recessions since 1947 has some evident contributors. The first two, beginning in 1948 and 1953, seem to have been affected by demobilization and peacetime adjustment following, respectively, World War II and the Korean War. For the following nine recessions, a series of other factors all played contributing roles (**Exhibit 1**). The cause of one recession, the downturn that began in 1990, remains less clear.

Postwar recessions have varied causes

EXHIBIT 1: U.S. RECESSION STATISTICS

Recession start date	Duration (months)		Most evident cause
	Expansion	Recession	
August 1957	39	8	Fiscal tightening
April 1960	24	10	Monetary tightening
December 1969	106	11	Fiscal tightening
November 1973	36	16	Oil price shock
January 1980	58	6	Oil price shock
July 1981	12	16	Monetary tightening
July 1990	92	8	Unclear
March 2001	120	8	Equity bubble popped
December 2007	73	18	Financial crisis

Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

The most recent recessions, beginning in 2001 and 2007, were sparked by financial shocks. While the bursting of the dot-com bubble in 2000–01 led to one of the shallowest postwar downturns, the subprime mortgage crisis of 2007–10 resulted in the deepest since the Great Depression. Factors explaining the different outcomes include differences in the sizes of markets involved; the distribution of ownership of impaired assets, especially by systemically important financial institutions; and the size of directly affected sectors in relation to the real economy.

[1] There are two notable exceptions, when Fed policy focused solely on inflation: the recessions starting in 1960 and 1981. In the more famous instance of 1981, growth collapsed after Paul Volcker's Fed raised the federal funds rate to 17.6% in April 1980 to combat high inflation, throwing the economy into a second recession. This policy move and subsequent recession helped to pave the way for today's lower and more anchored inflationary expectations.

SOURCES OF GREATER STABILITY

U.S. economic growth has become more stable over the past seven decades. Analyzing the variance and covariance of real growth and its subcomponents, we can identify several factors that have contributed to this stability.[2] Moreover, a number of factors that have added to variance — that is, made real GDP growth less stable — also have become apparent.

Our analysis examines the variance of quarterly changes in U.S. real GDP over rolling 10-year periods, with the first ending in the fourth quarter of 1957.[3] We find the subcomponent contributions to the change in volatility by calculating the contribution to quarterly real GDP growth of the 11 major sectors defined by the U.S. Bureau of Economic Analysis.[4]

Smarter and smoother inventory management

Lower inventory volatility has been a significant factor in increased economic stability (**Exhibit 2**). Improved inventory management has enabled corporations to adjust production capabilities more rapidly through just in time management. As a result, we see diminished evidence of inventory booms and busts, which in turn means fewer shocks to the economy.

Predictability in the housing sector

The decline in housing sector cyclicality has also contributed to increased economic stability. This decline reflects both a decreased overall demand for housing and diminished volatility in housing starts. In the past 10 years, housing starts have averaged 904,000 per month; in the five decades prior, average starts were nearly twice as high. This downward trend is likely a side effect of shifting demographics.

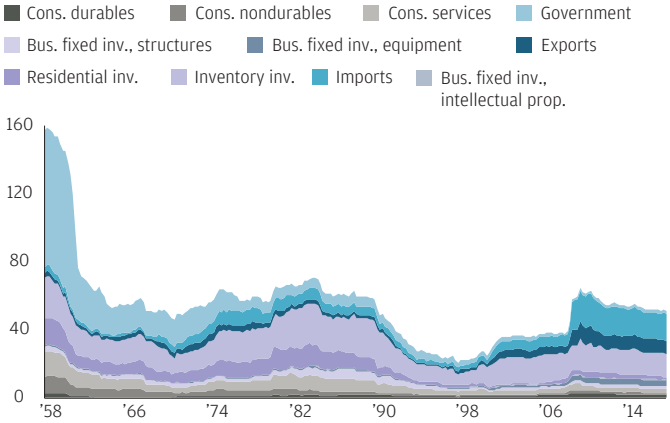
Perhaps more significantly, the standard deviation of housing starts over the last decade has fallen by nearly 25%. A persistently low interest rate environment, coupled with earlier deregulation of interest paid on deposits, has allowed for smoothed demand over time.

Smaller government, bigger economy

In recent decades, a reduced reliance on government spending helped make the economy more stable — in some ways, a counterintuitive finding. In 1957, government spending contributed nearly as much as consumption to GDP; this contribution has since decreased by roughly half, while consumption's contribution has increased by roughly a quarter. At the same time, government spending variance has fallen.

GDP variance has come down over time

EXHIBIT 2: AGGREGATE VARIANCE BY SUBCOMPONENT, 10-YEAR ROLLING PERIOD



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

A large component of this decline likely reflects historical trends. Public infrastructure investment, for example, was significantly higher in earlier decades, with the construction of the U.S. interstate highway system in 1956 providing a considerable tailwind to growth. Government expenditures on war were also substantial relative to the size of the U.S. economy. That said, it appears that high historical variance was perhaps more in measured GDP than in a broader assessment of real economic activity: In the early postwar years, government employment saw little volatility.

The implications of diminished covariance

It is worth noting that the covariance of GDP subcomponents has also declined over time (**Exhibit 3**). For example, whereas historically a fall in housing demand could slow consumption, possibly resulting in inventory mismanagement and weakened investment spending, today's economy is more resilient. Individual subcomponents are more insulated; in fact, GDP covariance has largely been negative since the turn of the century.

[2] Variance is broadly defined as how far a set of numbers are spread from their average value. Covariance is broadly defined as the measure of joint variability of two numbers.

[3] As a result, the scope of the analysis covers data beginning in 1947. This encompasses nearly the entirety of the postwar period.

[4] These are consumer durables, consumer nondurables, consumer services, business fixed investment in structures, business fixed investment in equipment, business fixed investment in intellectual property, residential investment, inventory investment, exports, imports and government.

The trade drag

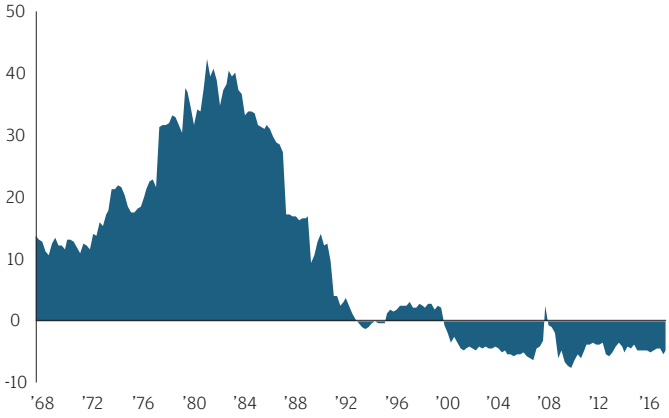
Trade has become an increasingly important part of the U.S. economy. Exports now account for roughly 14% of GDP, while imports are close to 19%.[5]

At the same time, the variance of these subcomponents has increased meaningfully, particularly for imports, which contribute roughly a quarter to overall GDP variance. Most of this increase happened recently, with variance doubling over the last decade. This may be attributable to the shifting nature of demand for overseas goods — consumer electronics are disproportionately produced overseas, for example — and large fluctuations in the U.S. dollar over the past decade, the unsurprising fallout from global economic and political turmoil.

We note, however, that higher import variance may not necessarily be a drag on economic growth, since large contractions in imports, particularly in response to recessions, can help bolster the economy.

GDP covariance has declined in recent decades

EXHIBIT 3: AGGREGATE COVARIANCE OF GDP BY SUBCOMPONENT, 10-YEAR ROLLING PERIOD



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

ULTIMATE CAUSES OF STABILITY

Although the average pace and volatility of quarter-to-quarter real GDP growth can be seen as the direct cause of successive negative quarters, thus meeting the unofficial definition of recession, history has often also revealed more ultimate causes, deeper imbalances that build up over many quarters or years. These might be unsustainable levels of demand, often manifesting as runaway price inflation, or rapid expansions of credit. Rapid monetary policy tightening, one evident cause of recessions historically, is often an attempt to correct these imbalances.

[5] Exports at 13.9% as of 2Q 2018; Imports at 18.5% as of 2Q 2018.

Expansions do not die of old age, but neither is recession risk constant, as underlying imbalances become more threatening as the economy progresses through the cycle. And because expansions now last longer than they have historically, there is more time for these threats to take hold. Wages and inflation tend to accelerate only once labor slack has tightened; spending tends to become stretched only once sentiment becomes exuberant. These factors are correlated and interconnected. A tighter job market, for instance, will tend to produce more optimistic households.

Other developments can make the expansion more fragile. As households grow increasingly confident, their saving rates tend to decline. All else equal, a lower saving rate means less buffer against a real income shock — from, say, a jump in the oil price. This could lead to a decline in real consumption. And once the economy has recovered fully and closing the output gap no longer provides a tailwind, the trend rate of growth slows.

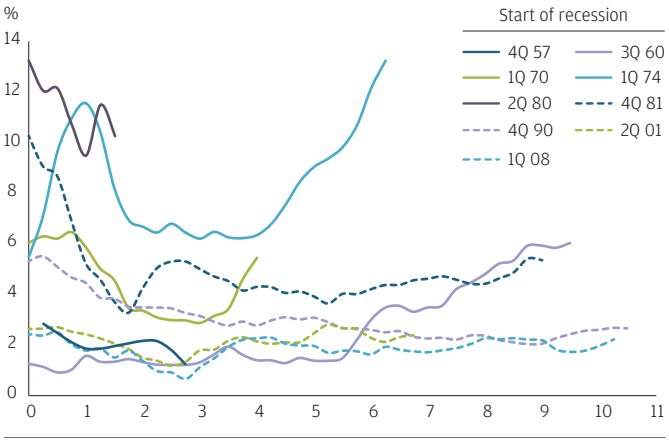
Some of these ultimate contributors to past recessions have faded in their relevance, and it is this change that is most relevant to the potential frequency of future recessions. Specifically:

- **Inflation**: Today runaway inflation seems unlikely to force a rapid tightening of monetary policy; over the last several decades, U.S. CPI has not only declined in magnitude but also grown less cyclical (**Exhibit 4**). Secular explanations range from the increased credibility of central bank inflation targets to the declining significance of labor unions and the offshoring of jobs. The increased sophistication of monetary policy also means that the Fed is less likely to tighten too aggressively in response to any threat of future inflation acceleration.
- **Credit**: The role of credit has also changed, but in more nuanced ways. On the one hand, easier access to revolving consumer loans has smoothed household consumption, making it less dependent on current income and savings. On the other hand, the expanding level of credit (**Exhibit 5**) poses its own risks: A credit bubble in the residential housing sector was a key contributor to the last recession. Aggregate private sector credit as a share of GDP is still increasing, and it is becoming notably extended in the nonfinancial corporate sector. Although regulation has made bank balance sheets more resilient, the threat of rapid credit expansions has not disappeared.

Other ultimate contributors to past recessions remain as relevant as ever. The economy will continue to be susceptible to unsustainable booms in investment and consumption, and rising income inequality will likely mean that a greater share of the population is living paycheck to paycheck, with little buffer against an adverse price shock or lost income.

Inflation has grown more quiescent and less cyclical

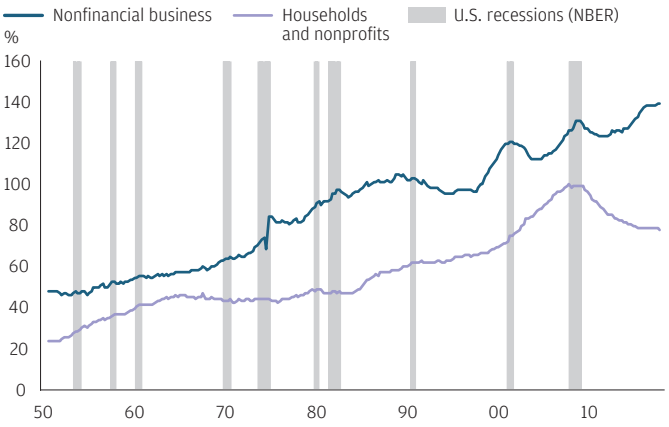
EXHIBIT 4: U.S. CORE CPI BY EXPANSION, % OF GDP Y/Y



Source: U.S. Bureau of Labor Statistics, NBER, J.P. Morgan Asset Management; data as of September 30, 2018.

Recession-inducing bubbles may still lurk

EXHIBIT 5: U.S. PRIVATE NONFINANCIAL SECTOR LIABILITIES AS % OF GDP



Source: U.S. Bureau of Economic Analysis, Federal Reserve, NBER, J.P. Morgan Asset Management; data as of September 30, 2018.

FUTURE U.S. RECESSIONS: LESS FREQUENT AND LESS DEEP, BUT WITH SLOWER RECOVERIES

What might be the frequency and depth of recessions over the next 15 years, given that the economy has become more stable over time? To answer that question, we have constructed a simple model of recession dynamics.

While the National Bureau of Economic Research, the unofficial scorekeeper of the U.S. business cycle, has a more complicated definition,[6] many economists describe a recession as the occurrence of two or more consecutive quarters of negative real GDP growth. Using this formulation, and looking purely at the pattern of real GDP growth over time, the probability of recession becomes a function of three parameters: (1) the average pace of real GDP growth; (2) the volatility of real GDP growth; and (3) any positive or negative correlation between real GDP growth rates over time. Specifically, the probability of recession falls when average growth rates are higher and rises when growth is more volatile. The probability of two consecutive negative quarters also rises when one quarter's growth is positively correlated with next quarter's growth, since this increases the chances of relatively rare negative quarters clustering together.

[6] A "recession is 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." "U.S. Business Cycle Expansions and Contractions." National Bureau of Economic Research, April 23, 2012, http://www.nber.org/cycles/cyclesmain.html.

MONTE CARLO SIMULATION

A simple econometric equation explaining quarterly percentage changes in real U.S. GDP, with a constant and a lag of its own value, allows us to calculate the historical value of all three parameters (the average level, variance and serial correlation of real GDP growth). We estimated the model over the post-WWII era (defined as 3Q 1948 to 2Q 2018). Doing so explains a portion of the change in real GDP over that period; the rest is explained by the random shocks that move growth.

If we assume that:

(1) shocks to the pace of real GDP growth are normally distributed,

(2) the average pace of real GDP growth going forward is the same as historically,

(3) shocks to that growth rate going forward have the same variance as historically, and

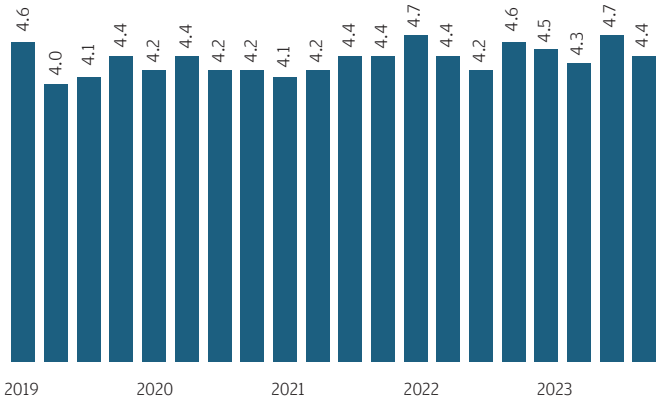
(4) real GDP growth going forward has the same autocorrelation as historically,

then we can use our estimated parameters and a random number generator to generate shocks in building a Monte Carlo simulation model. Specifically, we ran 10,000 iterations to estimate the probability of a recession starting in any given quarter, defining the start of a recession as two consecutive quarters of negative GDP growth following a positive one.* Over the next 15 years, adding up the number of times a recession starts in a given quarter over 10,000 iterations results in frequency and cumulative distributions of recession starts.

* This model assumes real GDP growth for this quarter is calculated as a function of a constant, real GDP growth in the prior quarter and a randomly generated real GDP shock. This shock is generated randomly and is normally distributed using the same variance as seen historically.

Historical data suggest recession probability of around 4% per quarter

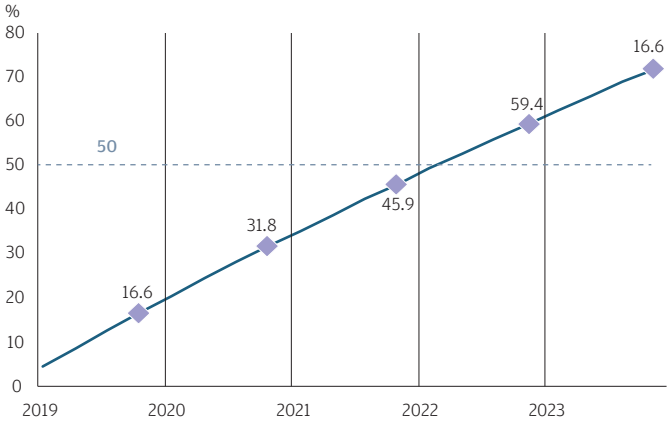
EXHIBIT 6: PROBABILITY PER QUARTER BASED ON 3Q48–2Q98 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

Historical data suggest 50% recession probability by 1Q 2022

EXHIBIT 7: CUMULATIVE PROBABILITY PER QUARTER BASED ON 3Q48–2Q18 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

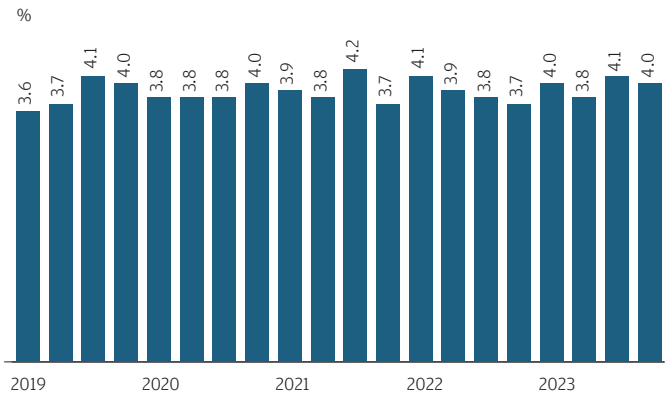
If, going forward, real GDP follows roughly its average behavior between 3Q 1948 and 2Q 1998 (a 50-year period), the chances of a recession starting in any given quarter are about 4.3% (**Exhibit 6**). Assuming that a recession will not begin in the second half of 2018, the simulations show that, on average, the probability of recession starting exceeds 50% 15 quarters from now. (**Exhibit 7**).

However, as we have discussed, the economy has become more stable over time. Estimating these parameters over the past 20 years vs. the 50 years before that should yield a lower probability of recession. This is, in fact, the case. Running the same equation over the past 20 years and using those parameter estimates to run simulations over the next 15 years result in a lower probability of a recession starting in any given quarter, with a 50% chance of the expansion surviving for another 17 quarters (**Exhibit 8** and **Exhibit 9**).[7]

[7] Remaining expansion length is based on an assumption that there is a zero percent probability of a recession occurring in the remaining quarters of 2018.

Recent data suggest recession probability of less than 4% per quarter

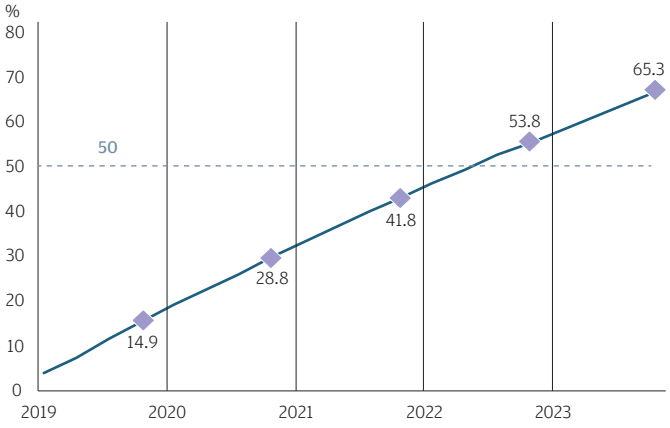
EXHIBIT 8: PROBABILITY PER QUARTER BASED ON 3Q98–2Q18 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

Recent data suggest 50% recession probability by 3Q 2022

EXHIBIT 9: CUMULATIVE PROBABILITY PER QUARTER BASED ON 3Q98–2Q18 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

It should be noted that a period of 17 quarters is not the expected length of future expansions. Rather, it represents the number of quarters any current expansion could be expected to survive, assuming that the future longevity of the expansion is unrelated to its present age (see "**Recession risks, expansion strength and the post-recession bounce**"). If a time traveler had arrived in a random expansion quarter in the postwar era, he or she could have expected to enjoy under four years of expansion before facing an impending recession. Based on the increased stability of the U.S. economy, if the time traveler arrived today, he or she would have a few extra quarters of growth.

RECESSION RISKS, EXPANSION STRENGTH AND THE POST-RECESSION BOUNCE

The probability assumption does not take into consideration the current position within the cycle. It therefore does not account for stronger early-expansion growth, which would diminish the probability of re-entering a recession within a year of the expansion start. Moreover, it underweights the probability of falling into a recession after the initial growth spurt, since growth tends to be lower – and therefore more susceptible to shocks – in any expansion quarter after the first year.

The same simulation model can tell us two other interesting things about future recessions. First, they should be less deep. The average recession from 1948 to 2018 involved a 1.9% decline in real GDP. However, based on GDP behavior over the last 20 years, a hypothetical future recession could involve just a 1.4% decline from peak to trough.

Second, recoveries are getting weaker. On average, in the three years following the 11 postwar recessions, the economy grew by 13.9%. However, based on the last 20 years of GDP volatility, a hypothetical future recovery could involve just 7.0% growth in the first three years.[8]

THE IMPLICATIONS OF GROWING GDP STABILITY OUTSIDE THE U.S.

Economies outside the U.S. have also become more stable over time. Looking at the variance of quarterly GDP growth throughout history, a similar trend to that of the U.S. is evident in major developed economies around the world.[9] Some economies have become more stable than others: Canada, the UK and Australia, for example, have become noticeably more stable throughout history, following a similar trajectory as the U.S. Japan, on the other hand, has seen GDP variance swing wildly. Europe is a more complicated story. Variance declined considerably before the financial crisis only to return, more or less, to prior peak levels; this is unique and likely reflects the second European recession, between 2011 and 2013.

An economy's underlying growth trend and volatility appear to be the key determinants of recession frequency. Australia, aided by the tailwind of a multi-decade commodity super-cycle, is in its 27th year of expansion; Japan, by contrast, where the underlying growth trend is the slowest among developed economies, has technically suffered four recessions within the last decade.

As declining economic variability has largely reduced the probability of recessions in the U.S., it has also done so in other countries. The UK, in particular, has seen probability decrease significantly – by nearly half – alongside similarly large moves in Australia and Japan. Canadian recession probability has declined as well, though by a smaller amount. Interestingly, the probability of a European recession has increased over the last two decades relative to history, again likely reflecting recent economic turbulence. If we ignore recent recessions, the resulting probability diminishes. This global downward trend has occurred alongside a fall in both economic variance and average growth rates (**Exhibit 10**).

[8] For any given economic recovery, it is clear that the first several quarters of an expansion are generally stronger than any subsequent quarters (historically by a multiple of 1.9). Therefore, while our crude model implies a roughly 0.5% quarterly growth rate throughout the first three years of recovery, we have adjusted this forecast to include an additional 0.4% of growth per quarter in the first four quarters of expansion to account for this phenomenon.

[9] Variance analysis is conducted using the same parameters as the analysis of U.S. growth. Time periods vary based on data availability: Japan begins 2Q 1955; Australia begins 3Q 1959; the UK begins 1Q 1960; Canada begins 1Q 1961; and Europe begins 2Q 1961. European data are based on the EU15, a 15-country subset of the European Union as provided by the OECD.

Global growth has become slower but more stable

EXHIBIT 10: GLOBAL ECONOMIC GROWTH STATISTICS

	Australia		Canada		Europe		Japan		UK		U.S.	
	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term
Avg. GDP growth rate (%)	0.8	0.9	0.4	0.6	0.6	0.8	0.2	1.0	0.5	0.7	0.6	0.8
Avg. GDP variance	34.4	106.9	40.0	67.4	30.5	36.9	117.6	150.2	38.1	92.6	36.9	84.3
Quarterly probability of recession (%)	4.7	6.6	4.8	5.3	4.3	3.8	5.3	7.6	4.7	8.6	3.9	4.3

Source: Australia Bureau of Statistics, Bureau of Economic Analysis, ESRI, OECD, ONS, Statistics Canada, J.P. Morgan Asset Management; data as of September 30, 2018.
Note: "Long-term" varies by country due to data availability: for Canada, since 1Q 1961; for Japan, since 2Q 1955; for the UK, since 1Q 1960; for Australia, since 3Q 1959; for the U.S., since 3Q 1948.

CONCLUSION

Our analysis has focused chiefly on the U.S., in part because U.S. recessions have often sparked downturns overseas. Since 1965, each U.S. recession, with the exceptions of shallower ones in 1970 and 2001, has corresponded with recessions in the euro area, the UK and (with the additional exception of 1980–81) Japan. Expanding international financial and trade linkages imply that a large enough shock to one economy is likely to have a domino effect on others; at the same time, shocks to domestic demand in one economy can often be offset by the cushion of international trade.

The trends highlighted in the U.S. appear to be relevant around the world: decreased economic variance and slower overall growth trends have yielded a more stable global economy. All in all, these effects mean that recessions are less likely to occur than in the past, both in the U.S. and abroad, and will likely be milder. When they do occur, recoveries will unfortunately be slower and market cycles could still be as violent as in the past, particularly if a more stable macro environment fosters the growth of asset bubbles. Overall, however, while investors will find trend economic growth slower than in the past, they should be able to take some comfort in a global economy that will likely also be steadier.

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