The U.S. Economy is in the Overheating Stage

U.S. Real GDP Growth vs Potential GDP Growth

Unemployment Gap and Fiscal Balance as a Percent of GDP

Faster Growth Has Boosted Core Inflation, Tariffs Will Exacerbate Inflationary Pressures

Core Inflation Lags Real GDP Growth By Six Quarters

- Real GDP, YoY% (LHS)
- Core CPI, YoY%, 6 Quarter Lag (RHS)

Core inflation lags real GDP growth by 18 months

CPI Laundry Equipment, 3 Month Percent Change

Response to 20% tariff on imported washing machines

Source: Guggenheim Investments, Haver Analytics, BEA. Data as of 09/30/2018.
Global Financial Conditions Will Tighten as QE Goes Into Reverse

Net Monthly Central Bank Purchases of Securities, in USD Billions (Includes Fed, ECB, BoJ, BoE)

10 Year Treasury Yields vs “Terminal Fed Funds” as Proxied by the January 2020 Fed Funds Futures Contract

10 Year Treasury Yields vs Actual Terminal Fed Funds as per the July 2006 Fed Funds Futures Contract

The Fed Will Keep Hiking as They Overshoot the Dual Mandate

Federal Reserve Dual Mandate Shortfall and Federal Funds Target Rate

Terminal Fed Funds Rate Projections Relative to Neutral (September 2018 SEP)

A Restrictive Fed Will be Problematic For Overleveraged Companies

Investment-Grade Corporate Credit Gross and Net Leverage Multiples

Corporate Spreads: Cumulative Change in Basis Points Around Recessions, Average of Last Three Cycles*

Ratio of BBB-Rated to BB-Rated Corporate Bonds Outstanding

Leverage will rise even further when earnings fall during the next recession

Tight Labor Market and Fading Fiscal Impulse Supports Our 2020 Recession Forecast

U.S. Unemployment Rate, with Months to Start of Next Recession After Full Employment Was Reached

U.S. Fiscal Impulse: Contribution to Real GDP Growth, in Percentage Points

Source: Guggenheim Investments, BLS, Haver Analytics, Citi, Congressional Budget Office. Unemployment rate data as of 09/30/2018. Fiscal impulse data bottom data as of Feb 2018.

Please See Important Disclosures in Back of Presentation
Our U.S. Recession Dashboard Points to Recession in H1 2020

Assumes Current Cycle Ends in February 2020

Unemployment Gap (Unemployment Rate - Natural Rate of Unemployment)

Real Fed Funds Rate - Natural Rate of Interest (r*)

3m-10Y Treasury Yield Curve (bps)

Leading Economic Index, YoY% Change

Aggregate Weekly Hours, YoY% Change

Real Retail Sales, YoY% Change

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GPIM 35905
US financial vulnerabilities

Paul Tudor Jones

October 24th, 2018
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PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE RESULTS, WHICH MAY VARY.
Key questions

- What are your views on current valuations in U.S. Treasury, equity, credit, and real estate markets?
- How has the recent rise in interest rates impacted valuations and what are the implications for the economy and financial markets?
Approach

- It is the combination of asset price overvaluation, excessive leverage, and weakened market structure that makes a financial system very vulnerable to shocks.

  “When asset prices are appreciating rapidly and expected to continue to do so, borrowers and lenders are more willing to accept higher degrees of risk and leverage.”

  S. Fischer, 2017

- This presentation tries to assess vulnerabilities through the lens of asset price valuation, leverage, and market micro-structure, and discuss how rising interest rates feed along these three axis to impact the economy.
Contents

- Asset price valuation ....................................................... slide 7
- Monetary policy and asset price cycles ........................................ slide 20
- Financial leverage cycles ......................................................... slide 28
Asset price valuation
Bond valuation: 10y real yields are very low, 250bp below the long-term peace-time average, or in the 80th percentile of overvaluation.

**US long-term real interest rate**
Nominal 10y rate deflated by 5y centered m.a. of annual CPI inflation, in percent

- Undervaluation
- Overvaluation

- War time
- Peacetime average
- 10y real interest rate

<table>
<thead>
<tr>
<th>Year</th>
<th>1790</th>
<th>1815</th>
<th>1840</th>
<th>1865</th>
<th>1890</th>
<th>1915</th>
<th>1940</th>
<th>1965</th>
<th>1990</th>
<th>2015</th>
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<tr>
<td>Rate</td>
<td>15</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>
Bond valuation: 10 year real yields are currently some 100bp below potential real GDP growth, or in the 70th %-ile of overvaluation since the Vietnam war. 

**US ex-post real 10-year yield vs. real potential GDP growth**

nominal 10y yields deflated by core CPI

1/ 70th percentile overvaluation refers to the spread between real potential growth (CBO) and real 10y yields
Bond valuation: the 10-year term premium is at historic lows, in the 99th percentile of overvaluation

**US bond valuation--bond risk premium (BRP)**

\[
\text{1/ BRP} = \text{compensation required to hold a bond above & beyond the expected path of nominal interest rates. This is proxied by the Adrian-Crump-Mooench 10-year term premium.}
\]

https://www.newyorkfed.org/research/data_indicators/term_premia.html. Source: Goldman Sachs
Equity valuation: At 35x, Shiller’s Cyclically-Adjusted P/E ratio is at levels only exceeded in 1929 and 2000, or in the 97th percentile of overvaluation.

**US equity valuation: cyclically-adjusted total return P/E ratio** 1/

Index

<table>
<thead>
<tr>
<th>Year</th>
<th>TR CAPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920</td>
<td></td>
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<tr>
<td>1930</td>
<td></td>
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<tr>
<td>1940</td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td></td>
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<td>1960</td>
<td></td>
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<td>1970</td>
<td></td>
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<tr>
<td>1980</td>
<td></td>
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<tr>
<td>1990</td>
<td></td>
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<tr>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
</tr>
</tbody>
</table>

**Index**

Overvaluation

Undervaluation

**Recessions**

**TR CAPE**

1/ TR CAPE = Price earnings ratio based on average inflation-adjusted earnings from the previous 10 years; this indicator is adjusted to account for share repurchases by reinvesting dividends into the price index and appropriately scaling the earnings per share. http://www.econ.yale.edu/~shiller/data.htm
Equity valuation: dividend yield (1.8%) is below 10y yield (3.2%) by 1.4% age pts (shown on an inverted scale below), implying a 56th %-ile of overvaluation.

**US equity valuation: dividend yield minus 10y UST yield**

Dividend/price minus 10y yield; %

- Overvaluation
- Undervaluation

[Graph showing US equity valuation: dividend yield minus 10y UST yield, indicating overvaluation and undervaluation over time.]
Equity valuation: the equity risk premium (stock’s expected return in excess of risk-free rate), at 3.7% is lowest on record, or a 100\textsuperscript{th} %-ile of overvaluation

**US equity valuation: equity risk premium (ERP)**

\[ ERP = \text{compensation required to hold a stock beyond expected earnings and real interest rates.} \]

\[ ERP = \text{constructed by adding a long-term average of real GDP growth to the earnings yield (inverse of CAPE ratio) and subtracting the nominal 10-year risk-adjusted bond yield (10y yield minus term premium) deflated by the 20-year average of CPI inflation as a proxy for long-run expected inflation.} \]

*Source: Goldman Sachs*
Equity valuation: US stocks are expensive by most metrics versus history. The median degree of overvaluation across 8 metrics is north of the 80\textsuperscript{th} percentile.

<table>
<thead>
<tr>
<th>Valuation metric</th>
<th>Current</th>
<th>Long term average</th>
<th>Historical percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV / sales (EV= enterprise value)</td>
<td>2.3</td>
<td>1.3</td>
<td>94</td>
</tr>
<tr>
<td>Total return CAPE</td>
<td>35.9</td>
<td>20.3</td>
<td>97</td>
</tr>
<tr>
<td>Price / Book</td>
<td>3.3</td>
<td>2.4</td>
<td>87</td>
</tr>
<tr>
<td>Forward P/E</td>
<td>16.9</td>
<td>15.1</td>
<td>76</td>
</tr>
<tr>
<td>Free cash flow yield</td>
<td>4.3</td>
<td>4.0</td>
<td>56</td>
</tr>
<tr>
<td>-(DY - 10y yield) (DY= dividend yield)</td>
<td>-1.4</td>
<td>-0.2</td>
<td>56</td>
</tr>
<tr>
<td>-(EY - 10y yield) (EY= earnings yield)</td>
<td>2.7</td>
<td>1.7</td>
<td>68</td>
</tr>
<tr>
<td>ERP (= equity risk premium)</td>
<td>3.7</td>
<td>8.5</td>
<td>100</td>
</tr>
<tr>
<td>Median metric</td>
<td></td>
<td></td>
<td>81</td>
</tr>
</tbody>
</table>

Source: Goldman Sachs and Tudor calculations
Credit valuation: corporate spreads are low by historical standards. Moody’s Baa spread, at around 190bp is in the 64th percentile of overvaluation.

**US credit valuation: corporate spreads**

- **bps**
- **Undervaluation**
- **Recessions**
- **Overvaluation**
- **Corp BAA**
Credit valuation—the High-Yield risk premium (the return in excess of that required to cover estimated expected loss) is in the 72\textsuperscript{nd} \%-%-ile of overvaluation.

**US credit valuation: credit risk premium (CRP), high yield 1/**

\[ CRP, \% \]

\[ CRP = \text{return in excess of the compensation expected loss over the life of the bond; expected losses are projected by changes in unemployment. Source: Goldman Sachs} \]
Housing valuation: housing prices are not as elevated as before the GFC. Prices/income: 42\textsuperscript{nd} %ile of overvaluation. Prices/rent: 87\textsuperscript{th} %ile of overvaluation.
US cross-asset valuation (stocks, bonds, credit, housing): large, synchronized degree of overvaluation (above 80\textsuperscript{th} percentile), as seen before past recessions

**US asset valuation: equity, bond, credit, and housing 1/**

percentile on rolling 10y z-scores of stock, bond, and credit risk premia and of the price/rent ratio (3mma)

1/ The chart above plots the 3m moving average of the percentile of a 10y rolling z-score of the simple average of four different valuation metrics (10y rolling z-scores) for bonds (term premium), stocks (equity risk premium), credit (credit risk premium) and housing (the house price to rent ratio)
US asset price valuation

- US asset prices display a large, synchronized degree of overvaluation (above 80th percentile), seen only before past recessions
  - Bonds are extremely overvalued (above 80th percentile of overvaluation)
  - Stocks are extremely overvalued (above 80th percentile of overvaluation)
  - Credit (HY) is very overvalued (around 70th percentile of overvaluation)
  - Housing is somewhat overvalued (around 65th percentile of overvaluation)

- As asset prices tend to mean-revert, a large overvaluation is likely to result, sooner or later, in a correction in asset prices

- But, markets have shown ability to sustain overvaluation for long periods of time (the average length of overvaluation spells for the stock market is 36 months vs. 20 months in the current cycle)—eventually making the adjustment to fair values more disorderly
Monetary policy and asset price cycles
Asset price (valuation) cycles tend to follow monetary policy cycles by 3+ years—we are 2 years into the beginning of the Dec 2016 tightening cycle and overvaluation should soon begin to revert.
In this monetary policy cycle, UST yields have been very compressed (e.g., beyond that explained by US growth) because of global QE.

**10-year UST and Bund yields**

- **US 10y rate**
- **German 10y rate**

Recessions
But QE is ending, shrinking global central bank b/s, a powerful driver that will lift global rates: UST 10y rates back to 4.5% ?
Because of CB tightening, rising rates may be at the point where the bond-equity return correlation goes positive, exacerbating any market sell off triggered by higher rates.

**US bond and equity return correlation**

36m rolling correlation of monthly equity & 10y bond returns

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Exhibit 3: S&P 500 typically cannot digest rapid increases in bond yields as of September 30, 2018; z-score versus trailing 3 years since 1965

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Source: FRB, FactSet, Goldman Sachs Global Investment Research
A positive bond-equity return correlation also lowers the diversification benefit of ever-growing passive-allocation strategies (herding) and of levered stock market bets, exacerbating any market sell off triggered by higher rates.
Lower liquidity and cash buffers can also aggravate any market sell off, as investors jam at the exit door.

**Market liquidity**

- **LHS:** Value of market turnover/value of outstand. bonds
- **RHS:** Corporate security transactions over their stock 6mma, in percent

**US Mutual Fund Cash Holdings and Money Market Fund AUM**

- **% of Market Cap**

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<table>
<thead>
<tr>
<th>Year</th>
<th>USTs</th>
<th>JGBs</th>
<th>Corporate securities (RHS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td></td>
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<tr>
<td>1998</td>
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<td>2012</td>
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<tr>
<td>2015</td>
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</tbody>
</table>
A large stock market decline is now more harmful (wealth effect) than any past time as market capitalization in percent of GDP is highest on record and the US equity market remains largely (85%) domestically owned.
Financial leverage cycles
Where is leverage concentrated? We will come to regret current fiscal irresponsibility given the coming (after 2025) massive entitlement crisis. Higher issuance, lower CB purchases will push up market-clearing yields.

**US government debt projections**

% of GDP; CBO's alternative scenario

*A legitimate question is whether too low interest rates have induced higher gov’t borrowing*
Where is leverage concentrated? Corporates indebtedness is at historic highs. Debt service is rising sharply, despite low rates and spreads.

**US corporate leverage**
Sources: Fed Board and BEA; $ tr.

- Nonfinancial corporate $tr (LHS)
- Nonfinancial corporate %GDP (RHS)

**Corporate debt service and yields**

- Moody's corporate bond yields
- Net interest payments in perc. of corporate income (RHS)
Where is the leverage? Hidden dangerous leverage increases with the maturing of the financial cycle: credit is increasingly channeled to marginal (riskier) borrowers (“subprime”), increasing the economy’s interest rate sensitivity.
High economy-wide leverage (which will be higher after then next market crash/recession) makes each hiking cycle more painful to sustain.

**US: total debt to GDP, recessions and stock market cycles**

*Household, corporate and government debt as % of US GDP*

- 136% of GDP when S&P topped in November 1980
- 145% of GDP when S&P topped in June 1983
- 180% of GDP when S&P topped in August 1987
- 183% of GDP when S&P topped in March 2000
- 224% of GDP when S&P topped in Oct
- 248% of GDP Latest

---

Heavier debt burdens are getting difficult to sustain over time—in the last 4 recessions, it took decreasing levels of interest rates to derail the economy.
In this financial leverage cycle, it will take 10y yields to reach 4.6% to match the peak in (our proxy for) debt service that preceded the last two recessions.
The speed at which rates increase matters too. The 24m change (3.5%) in the economy-wide debt service proxy is already above past recession thresholds.

**Financial leverage cycles**
24m change in (non-fin debt/gdp * 10y yield); %ge points