Inflation Tail Risks

Prof. Arvind Krishnamurthy
Money and Banking
WHAT IS CAUSING INFLATION?
Year-on-year inflation
Services share from NIPA Personal Consumption

Services Share (Services/(Goods + Services))
Wages and Prices

Fast-food prices and wages, change vs. a year ago

- Fast-food average hourly wage
- Fast-food prices
Quantity of labor
Price of labor: 1st quartile (yellow) is lowest wages
Inflation swaps: 1 year, 5 year, 10 year

Last Price
- USSWIT1 BGN Currency (L1) 4.1630
- USSWIT5 Currency (R1) 2.9803
- USSWIT10 Currency (R1) 2.7120
Uneven inflation around the world
## Uneven downturn and recovery (real GDP annual)

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2021 est</th>
<th>2022 IMF proj</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>-3.8%</td>
<td>5.7%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Germany</td>
<td>-4.6</td>
<td>2.9</td>
<td>4.4</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>-10.2</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Canada</td>
<td>-6.4</td>
<td>5.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Japan</td>
<td>-4.3</td>
<td>2.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Italy</td>
<td>-8.6</td>
<td>5.9</td>
<td>4.3</td>
</tr>
</tbody>
</table>
## Fiscal support differences

<table>
<thead>
<tr>
<th></th>
<th>Fiscal Support (% of GDP)</th>
<th>Loans, Equity, Guarantees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US</strong></td>
<td>25.6%</td>
<td>2.4%</td>
</tr>
<tr>
<td><strong>UK</strong></td>
<td>16.2</td>
<td>16.1</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td>16.1</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td>15.9</td>
<td>28.3</td>
</tr>
<tr>
<td><strong>Canada</strong></td>
<td>14.6</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td>11.0</td>
<td>27.8</td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>8.5</td>
<td>35.3</td>
</tr>
</tbody>
</table>
Blue = US; White = Germany; Red = Japan
All series are 2-year CPI Inflation Swap
UK inflation swap is RPI (overstates by about 1%)
5y-5y forward inflation: US (blue); Euro (white)
INTEREST RATES
“Suppose we faced a very different economic environment: *Imagine that inflation was running at 5% against our inflation objective of 2%. Is there a doubt that any central banker worth their salt would be reacting strongly to fight this high inflation rate? No, there isn’t any doubt. They would be acting as if their hair was on fire. We should be similarly energized about improving conditions in the labor market.*”

Taylor Rule with only inflation (i.e., u near u*)

\[ i_{ff} = \Pi + r^* + (\Pi - \Pi^*) - K_2 (u - u^*) \]

- If inflation at 4.1%; target (\( \Pi^* \)) is 2%
- Suppose growth rate steady state is 1% (\( r^* \))
- Then … \( i_{ff} \) should be 7.2%
Inflation and interest rates

- Expected inflation is now about 4.1% for the next one year
- One-year nominal rates around 0.5%
- Real rate = -3.6%
- *Buy stuff now? But what … transitory vs permanent*
Taylor Rule with only inflation (i.e., $u$ near $u^*$)

\[ i_{ff} = \Pi + r^* + (\Pi - \Pi^*) - K_2 (u - u^*) \]

- If inflation at 3%; target ($\Pi^*$) is 2%
- Suppose growth rate steady state is 1% ($r^*$)
- Then \( i_{ff} \) should be 5%
Fed Funds Futures
10 year bond yields: US (white), UK (red), Germany (purple)
Inflation tail risk .. if it ends up raising long rates

- Real estate
- Equity valuations
- Government fiscal situation can worsen
Inflation, housing and affordability

- Buy $300K home, with 20% down ➔
  - $240K mortgage at 4%, monthly payment = $1,146

- Suppose household has monthly income of $4000. Rule of thumb for payment-to-income around 28%
  - Affordable payment = $1,120
  - So, the 300K home is just about affordable
Suppose inflation goes from 2% to 4% and mortgage rates rise from 4% to 7%:

- inflation + fed raises rates to combat inflation
- $240K mortgage at 7%, monthly payment = $1,597

Today monthly income still $4000 (grows at 4% with inflation).

- Affordable payment still = $1120
- So, max home price affordable = \( \frac{1120}{1597} \times 300K = 210K \) vs $300K
Real estate and crises
Firm valuation

- Gordon growth formula:

\[ P = \frac{D}{(r + \pi + ERP) - (g_{nominal} + \pi)} \]

- Inflation roughly a wash for a very long-duration asset
- For short-duration assets, Fed hikes can weigh more heavily
- But if real estate falls ... Spending feedbacks, ERP rises
Takeaways

- Inflation is likely tied to uneven recoveries and bottlenecks
  - Faster recovery, fiscal support in US hits various bottlenecks
  - Some of that around the world

- Despite inflation and expected inflation, long-term nominal yields have remained stable
  - And despite a very dovish Fed
  - Puzzling to me … much lower growth prospects?

- If long rates react more normally, there are other risks…
Our coverage in one slide:

- Inflation determination
- Labor market, unemployment
- Fed objectives, Taylor Rule

Macro-Economy

Fed
- What is “money”?
- Monetary system
- Bank reserves
- Fed balance sheet
- Policy tools
- Quantitative easing

Asset Markets
- Debt markets
- Yield curve analytics
- Expectations hypothesis
- Long maturity bond yields
- Stock market valuation
EXTRA: GOVERNMENT FINANCES
Government debt
Government debt maturity

Treasury Maturity Profile History

Calendar Year

Percent

- Percent Maturing <= 1 Year
- Percent Maturing <= 3 Years

09/30/21
52%

09/30/21
29%
Inflation scare and debt

- Suppose all debt is short-term and there is an inflation scare

\[ i = r + \pi - LiqPrem \]

- And \( g = r + \pi \)

- Debt still sustainable.

- Tax receipts grow at the rate of inflation
Inflation and debt

- Suppose now debt is all long-term and inflation rises from $\pi_0$ to $\pi_1$

\[ i = r + \pi_0 - LiqPrem \]

- And $g = r + \pi_1$

- Tax receipts grow at the rate of inflation; interest rate locked in

- Debt is “inflated” away
  - Reality is in the middle since 30 - 50% of debt is short-term
Inflation, debt, and Taylor rule

- Go back to debt is all short-term.
- Fed has historically raised rates approx two-for-one with inflation

\[ i = r + b \pi \quad \text{with} \quad b = 2 \]

- So \( g - i = \text{LiqPremium} - (b - 1)\pi \)

- Debt is not sustainable

- Does that mean that the Fed will be strong-armed to set \( b = 1 \)?