Monetary Policy Drivers of Bond and Equity Risks

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We have become used to the idea that US Treasury bonds are hedges:

- The only asset class that gained in value during the global financial crisis.
- Negative beta with stocks since the year 2000.

When the economy weakens,

- Inflation falls.
- Real interest rates decline.
- Investors “flee to quality”, into Treasuries and out of stocks.

All three factors drive up the prices of Treasuries

- And the last two drive up the prices of TIPS.
But This is New

- The past 15 years are highly unusual.
- In earlier decades, Treasuries had a **positive** beta with stocks.
- In the 1980s in particular, when the economy weakened,
  - Inflation rose.
  - Real interest rates rose.
  - The flight to quality was into cash or commodities, and out of both stocks and Treasuries.
- All three factors drove down the prices of Treasuries
  - And the last two would have driven down the prices of TIPS (which had not yet been issued).
Changing Risks of Treasury Bonds

CAPM Beta of 5-yr Nominal Bond (1961.Q1-2015.Q2)

Monetary Policy Break 1 (1977.Q2)

Monetary Policy Break 2 (2001.Q1)
Why Does This Matter? (1)

The ability of Treasuries to hedge economic and equity risks has huge implications for investors.

- Treasuries hedge stocks in endowment portfolios.
  - The risk reduction allows endowments to reduce cash or even use leverage (Harvard).

- Equity investing is riskier for pension funds with long-term nominal liabilities.
  - Stocks will do poorly at the same time as interest rates decline, increasing the present value of liabilities.
  - The “perfect storm” of underfunding.
  - “Over the past decade, the correlation of stocks and bonds has remained persistently negative (causing big problems for pension funds that are essentially long stocks and short bonds)” – Bridgewater Associates, LP, 2013.
Why Does This Matter? (2)

The ability of Treasuries to hedge economic and equity risks has huge implications for investors.

  - In a recession, inflation declines so the real burden of the debt increases even as real earnings decrease.
  - Defaults are likely just when Treasuries are doing particularly well.

- We should expect to see the effects on risk premia and spreads:
  - Low term premium (risk premium on Treasuries relative to cash).
  - High default premium (risk premium on corporate bonds relative to Treasuries).
  - These premia may lower the Treasury yield spread (Greenspan “conundrum” of mid-2000s) and increase the corporate credit spread.
An Estimate of the Treasury Term Premium
Campbell, Sunderam, and Viceira, 2013
More Estimates of the Treasury Term Premium
Adrian, Crump, Diamond, and Yu 2015
Inflation Risk and Corporate Debt (Kang-Pflueger)

Panel (a) Inflation Volatility = 0

Panel (b) Inflation Volatility > 0

Panel (c) Pro-cyclical Inflation

Panel (d) Countercyclical Inflation
Inflation Volatility and Corporate Credit Spreads (K-P)

Figure 5. International credit spreads and inflation volatility. This figure shows the co-movement of quarterly credit spreads (solid) and inflation volatility (dashed) for Australia, Canada, Germany, Japan, the United Kingdom, and the United States. Credit spreads are computed as investment-grade corporate bond index log yields in excess of duration-matched nominal government bond log yields, except for the U.S. credit spread, which is the Moody's Baa minus Aaa log yield spread. Inflation volatility is computed using a three-year backward-looking window of quarterly inflation surprises.
Figure 6. International credit spreads and inflation-stock correlation. This figure shows the comovement of quarterly credit spreads (solid) and the inflation-stock correlation (dashed) for Australia, Canada, Germany, Japan, the United Kingdom, and the United States. Credit spreads are computed as investment-grade corporate bond index log yields in excess of duration-matched nominal government bond log yields, except for the U.S. credit spread, which is the Moody’s Baa minus Aaa log yield spread. The inflation-stock correlation is computed using a three-year backward-looking window of quarterly surprises in inflation and stock returns, as described in Table IV.
Macroeconomic Sources of Changing Risks

What has caused this change in bond risks? Two hypotheses:

2. Changes in monetary policy.

Campbell, Pflueger, and Viceira (CPV 2015) use a structural macroeconomic model to disentangle these effects.
CPV Macro Model

- Expanded version of modern New Keynesian macro model:
  - Like the standard model, it generates dynamics of difference between output and potential output (output gap), inflation, and Fed Funds rate (monetary policy instrument).
  - And it also endogenously generates countercyclical asset return volatility and risk premia, needed to fit movements in bond and stock prices.

- Why do we need a New Keynesian framework for macro dynamics?
  - It allows inflation to affect the real economy and thus carry a risk premium.
  - It allows monetary policy to have real effects.
Building Blocks of New Keynesian Macroeconomics

- A New Keynesian framework has three building blocks:
  - A description of consumers’ behavior that links output and real interest rates in equilibrium: the Investment and Savings (IS) curve.
  - A description of firms’ price-setting behavior that links inflation and output in equilibrium: the Phillips Curve (PC).
  - A description of the Fed’s procedure for setting interest rates: the Monetary Policy (MP) rule.

- I will spare you the details except for the monetary policy rule.
Fed Behavior: Monetary Policy Rule

\[ i_t = \rho^i i_{t-1} + (1 - \rho^i) \left[ \gamma^x x_t + \gamma^\pi (\pi_t - \pi^*_t) + \pi^*_t \right] + u^M_P \]

- Taylor (1993) rule with Fed funds rate \( i_t \) as policy instrument (Clarida, Gali, and Gertler 1999).

- Fed funds target (in square brackets) increases in the output gap \( x_t \), the inflation gap \( \pi_t - \pi^*_t \), and the long-run inflation target \( \pi^*_t \).

- Fed funds rate adjusts gradually to target.
Fed Behavior: Long-Run Inflation Target

\[ \pi_t^* = \pi_{t-1}^* + u_t^* \]

- Shocks to long-run inflation target \( \pi_t^* \) are persistent, capturing
  - Changes in Fed policy not immediately accompanied by interest rate changes.
  - Changes in public expectations of Fed behavior and credibility.
  - Dynamics of \( \pi_t^* \) consistent with long-term variation in inflation and interest rates.
Fed Behavior: What Do the Parameters Mean?

\[ i_t = \rho^i i_{t-1} + (1 - \rho^i) \left[ \gamma^x x_t + \gamma^\pi (\pi_t - \pi^*_t) + \pi^*_t \right] + u^M_P \]

- \( \gamma^x \) tells you how much the Fed worries about recessions and cuts interest rates to prevent them.
- \( \gamma^\pi \) tells you how much the Fed worries about inflation and raises interest rates to prevent it.
- \( \rho^i \) tells you how gradually the Fed moves when it changes rates.
- Volatility of shock \( u^M_P \) tells you how much unexplained short-term variation there is in the Fed funds rate.
- Volatility of inflation target shock \( u^*_t \) tells you how much the Fed’s long-run inflation target moves around (this movement also shows up in long-term bond yields).

Campbell, Pflueger, Viceira (2015)
Monetary Policy Regimes

Break date tests indicate three monetary policy regimes.

- **Pre-Volcker period (1960.Q2-1977.Q1):**
  - Accommodation of inflation.

  - Aggressive counter-inflationary policy (Clarida, Gali, and Gertler 1999).

- **Late Greenspan - Bernanke period (2001.Q1-2011.Q4):**
  - Coincides with end of great economic expansion of 1990s.
  - Renewed focus on fighting recessions.
  - Fed acts much more gradually.
  - May be related to new emphasis on transparency and forward guidance.
Monetary Policy Regimes and Bond Beta

CAPM Beta of 5-yr Nominal Bond (1961.Q1-2015.Q2)

Monetary Policy Break 1 (1977.Q2)

Monetary Policy Break 2 (2001.Q1)
Estimating the Model in Three Regimes

<table>
<thead>
<tr>
<th>Monetary Policy Rule</th>
<th>60.Q2-77.Q1</th>
<th>77.Q2-00.Q4</th>
<th>01.Q1-11.Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Weight $\gamma^x$</td>
<td>0.33</td>
<td>0.28</td>
<td>0.84</td>
</tr>
<tr>
<td>Inflation Weight $\gamma^\pi$</td>
<td>0.60</td>
<td>1.61</td>
<td>1.60</td>
</tr>
<tr>
<td>Persistence MP $\rho^i$</td>
<td>0.60</td>
<td>0.64</td>
<td>0.82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Std. Shocks</th>
<th>60.Q2-77.Q1</th>
<th>77.Q2-00.Q4</th>
<th>01.Q1-11.Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. PC</td>
<td>0.80</td>
<td>0.35</td>
<td>0.27</td>
</tr>
<tr>
<td>Std. MP</td>
<td>0.77</td>
<td>1.56</td>
<td>0.61</td>
</tr>
<tr>
<td>Std. Infl. Target</td>
<td>0.10</td>
<td>0.11</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Campbell, Pflueger, Viceira (2015)
How the Shocks Move the Economy

- Our model has three shocks and three regimes.
- Shocks are PC (supply), MP (short-term monetary), and inflation target (long-term monetary).
- Regimes are 60.Q2-77.Q1 (blue), 77.Q2-00.Q4 (green), 01.Q4-11.Q4 (red).
- We show “impulse responses”, initial effects and subsequent adjustment paths.
Causes of Changing Treasury Risks

Campbell, Pflueger, Viceira (2015)
Impulse Response Functions: PC and MP Shocks

- Inflationary PC shock has a persistent inflationary and contractionary effect:
  - Stock prices fall as a result of a persistent decline in dividends and output and an increase in the equity risk premium.
  - Bond prices fall as a result of persistent inflation; an aggressive anti-inflationary central bank reaction (Paul Volcker) adds to this decline.
  - **Positive** impact on nominal bond beta is strongest in the Volcker period.

- MP shock acts raises nominal and real short-term interest rates and causes a recession:
  - Stock and bond prices both fall.
  - **Positive** effect on nominal bond beta is largest in the third subperiod where MP shocks are persistent.
Impulse Response Functions: Inflation Target Shocks

- Inflation target shocks have a permanent but delayed impact on inflation and create a temporary boom.

- Stock prices rise in response to higher dividends and lower risk premia.

- Nominal bond prices fall due to higher expected inflation.

- Inflation target shocks have a negative effect on the nominal bond beta.
Putting It Together: Monetary Policy Matters

![Graph showing model nominal bond betas over time](image-url)
Why Has the Bond Beta Changed Over Time?

- Anti-inflationary US monetary policy stance after 1977 (Paul Volcker) increased nominal bond beta:
  - Large increase in Fed funds rate in response to inflation shock.
  - Increase in Fed Funds rate depresses output, stock prices, and bond prices.

- Negative nominal bond beta in 2000s due to
  - Smaller supply shocks.
  - Renewed Fed focus on recessions.
  - Inflation target shocks (which may represent changes in what investors think the Fed will do in the long run).
What About Flight to Quality?

- Flight to quality cannot by itself explain the change in bond risks.
- If bonds are seen as risky (moving in the same direction as stocks), then flight to quality hurts bonds and stocks together, amplifying the positive bond beta.
- If bonds are seen as hedges (moving opposite stocks), then flight to quality hurts stocks but helps bonds, amplifying the negative bond beta.
- Flight to quality is an amplification mechanism (built into the CPV model), but cannot be the whole story.
Asset Class Risks Are Not Stable

- Asset allocation exercises often treat the risks of asset classes as stable, even if the expected returns are thought to vary over time.
  - Use of very long-run historical data to estimate these risks.
- In the case of Treasuries, this practice is dangerous.
  - Bond risks have moved over time and depend on macroeconomic shocks and the stance of monetary policy.
  - While there is no reason to expect any immediate change, investors must keep a careful eye out for a change in the bond beta back towards the historical norm.
  - **You can’t count on Treasuries!**
- Similar principles apply to many other asset classes such as commodities and real estate.
References


