Back to the 1980s or Not? The Drivers of Inflation and Real Risks in Treasury Bonds
Discussion

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Summary

- Goal: understand time-varying correlation of stock and bond returns
- Campbell, Pflueger, and Viceira (2020): habit, inflation, stocks, and bonds
  - Correlation of inflation and output gap switched from + to – in 2001
  - Before 2001: Treasuries are risky
  - After 2001: Treasuries are hedges
  - Structural break in output gap/inflation correlation in 2001: – to +
  - Key: Time-varying risk premia
  - **Exogenous inflation process**
- This paper: endogenous inflation
  - Same Euler equation and asset pricing model
  - Philips curve, monetary policy → endogenous inflation
  - "Structural" shocks

Summary

- 1980-2001 vs. 2001-2019: Monetary policy, inflation, and Treasury yields
- **New-Keynesian model**: Euler equation, Philips curve, MP rule
- Asset pricing: **habit with time-varying risk aversion**
- Exogenous shocks: "supply", MP, "demand"

- Calibrations: **1980-2001** vs. **2001-2019**
- Some parameters held constant: $g, \gamma, \bar{R}^f$, habit, persistence
- Different across subsamples:
  - **MP rule**
  - **Volatilities of shocks**
  - Adaptive inflation expectations (why?)
  - Leverage (why?)
- Goal: match asset pricing moments, in particular stock-bond correlation

New element: Bond preference shock

- Yield of 1-period nominal bond i_t is set by the Fed + Fisher eqn:

$$r_{1,t} = \exp(E_t \pi_{t+1} - i_t)$$

- Yields of real/nominal bonds, stocks: Euler eqn with $M_{t+1} = M(\Delta c_{t+1}, s_t)$

$$1 = \boxed{\exp(-\xi_t)} \; E_t[M_{t+1} R_{1,t+1}]$$

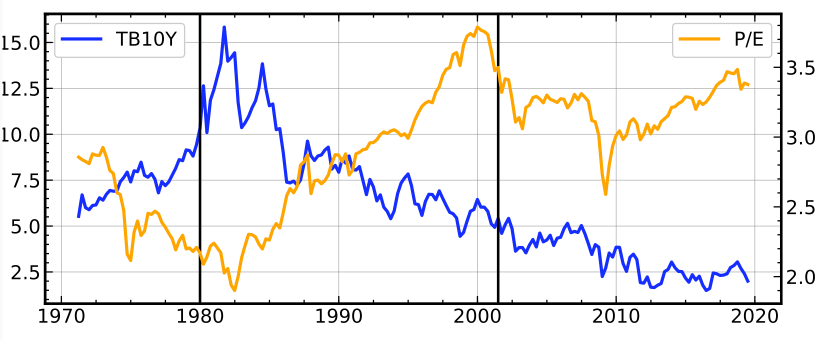
$$P_{n,t} = \boxed{\exp(-\xi_t)} \; E_t[M_{t+1} P_{n-1,t+1}]$$

- ξ_t does **not** (directly) affect stock prices: $E_t[M_{t+1} R_{s,t+1}] = 1$
- Paper: ξ_t is a **preference** shocks of stocks vs. bonds
- Alternative interpretation: **slope** shock (given C_t)
  → short rate is set by Fed and given $E_t \pi_{t+i}$
  → $\xi_t > 0$ raises longer yields more than short yields
  → yield curve **steepens**
- Euler equation: ξ_t affects Δc_{t+1}

Model: Bond preference shock

- GE effect of $\xi_t > 0$:
  - Direct effect: $Y_{n,t} \uparrow$
  - EIS<1 $\rightarrow$ consumption and output gap $\uparrow$
    $\rightarrow$ Risk aversion $\downarrow$ $\rightarrow$ risk premia $\downarrow$
    $\rightarrow$ Asset prices $\uparrow$ $\rightarrow$ $P_t/D_t \uparrow$, $Y_{n,t} \downarrow$
    $\rightarrow$ positive correlation of stocks and bonds
  - (Net effect of ξ_t on $Y_{n,t}$: $\lesseqgtr 0$)
- Implication: ξ_t plays many roles simultaneously
  1. Moves **yield curve**
  2. Affects **consumption** (via Euler equation) $\rightarrow$ **"demand"** shock (?)
  3. Shock to **output gap**
  4. Shock to **risk aversion/risk premia** of all assets (habit preferences)

Correlation of stocks and bonds



	Stocks	LT Bonds	Return correlation
1970-1982	$P_t \downarrow,\ R_t^s < 0$	$Y_t \uparrow,\ R_t^b < 0$	$\rho(R^s, R^b) > 0$
1982-2001	$P_t \uparrow,\ R_t^s > 0$	$Y_t \downarrow,\ R_t^b > 0$	$\rho(R^s, R^b) > 0$
2001-2019	$P_t, R_t^s \approx 0$	$Y_t \downarrow,\ R_t^b > 0$	$\rho(R^s, R^b) \approx 0$

1979-2001 vs 2001-2019 subsamples

- Three exogenous shocks
  1. Demand/bond yield shock
  2. Supply shock: productivity + sticky wages + adaptive inflation expectations
     → Philips curve
  3. Monetary policy (MP) shock
- Key result: **importance** of shocks differs in subsamples:
  - 1979-2001: $\sigma(\text{supply}), \sigma(\text{mp}) > 0,$ $\sigma(\text{demand}) \approx 0$
  - 2001-2019: $\sigma(\text{demand}) > 0,$ $\sigma(\text{supply}), \sigma(\text{mp}) \approx 0$
- MP rule:
  - 1979-2001: $\gamma^{\pi} = 1.35, \quad \gamma^{X} = 0.5 \quad \rho^{i} = 0.54$
  - 2001-2019: $\gamma^{\pi} = 1.10, \quad \gamma^{X} = 1.0 \quad \rho^{i} = 0.80$
- Other parameters: stickiness of expectations, leverage
  - 1979-2001: $\zeta = 0.60, \quad \delta = 0.5$
  - 2001-2019: $\zeta = 0.0, \quad \delta = 0.66$

Shocks and asset prices: risk aversion and "dividends"

- The correlation of stocks and bond depends on 2 effects:
  1. **Risk aversion**:
     - C_t, output gap $\uparrow$ $\rightarrow$ RRA, risk premia $\downarrow$
       $\rightarrow$ all asset prices $\uparrow$
       $\rightarrow$ **positive** correlation of stocks and bonds
  2. **"Dividends"**:
     - Stocks: $D_t = C_t = Y_t$
     - Bonds: $1/\Pi_t$
     - $\text{Corr}(R_t^s, R_t^b)$ depends on $\text{Corr}(\Delta c_t, \pi_t) \lesseqgtr 0$
- Model:
  - **MP rule** affects inflation dynamics and dividend/inflation correlation
  - Different shock have different effects on risk aversion, dividends, and inflation mix of shocks important

Shocks and asset prices

	1979-2001		2001-2019
Fed focus	Inflation		Output gap
Shocks	Supply/PC	MP	Demand/bonds
Policy rate i_t	↑↑	↑↑	↑↑
Inflation	↑↑	$= 0$	≈ 0
Output gap	↓↓	≈ 0	↑↑
Consumption	↓↓	≈ 0	↑↑
Risk aversion	↑↑	↑	↓↓
P/D stocks	↓↓	↓	↑↑
Nominal 10-year yield	↑↑	↑	↑
R_t^s stocks	↓↓	↓	↑
R_t^b stocks	↓↓	↓	$\lesssim 0$
$\text{Corr}(\Delta c_t, \pi_t)$	< 0	≈ 0	≈ 0
$\text{Corr}(R_t^s, R_t^b)$	> 0	> 0	$\lesssim 0$

Comments

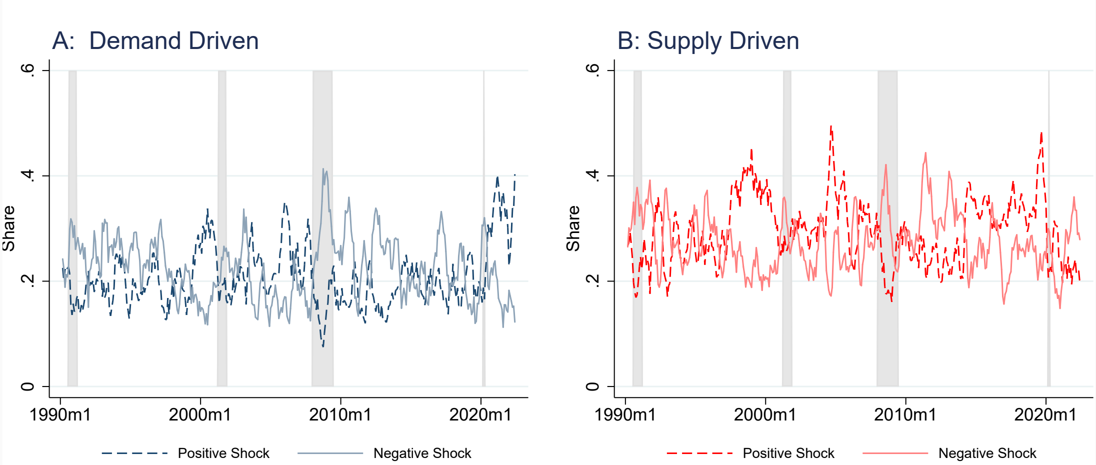
- Change in MP rule: reasonable
- How about shocks?
  - σ(supply) = 0.58 → 0.07
  - σ(MP) = 0.55 → 0.07
  - σ(demand) = 0.01 → 0.59
- Shapiro (2022): estimate contributions of supply and demand shocks to inflation using price, quantity, and expenditure data
- Important episodes for stock markets:
  - Late 1990s: dot.com boom and correction
  - Early 2000s: housing boom
  - Late 2000s: financial crisis and recovery
  - Early 2020s: COVID

→ How do these "shocks" fit into the shocks in the model?

- Greenwald, Lettau and Ludvigson (2022): high stock returns between 1970 and 2000's partially due to declining labor share

Shapiro (2022): "Decomposing Supply and Demand Driven Inflation"

Figure 1: Share of PCE by shock type

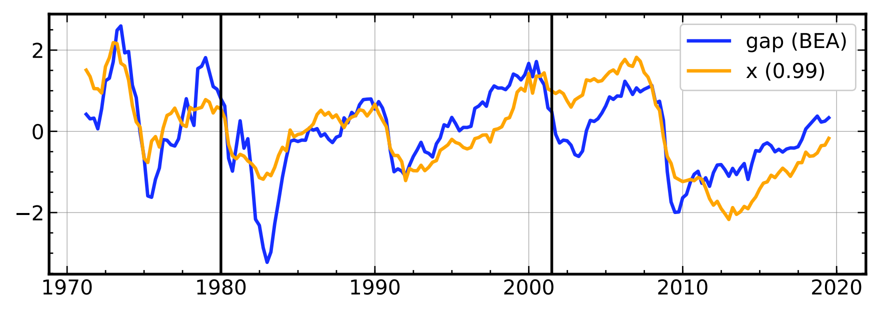


Calibration: Output gap and habit process

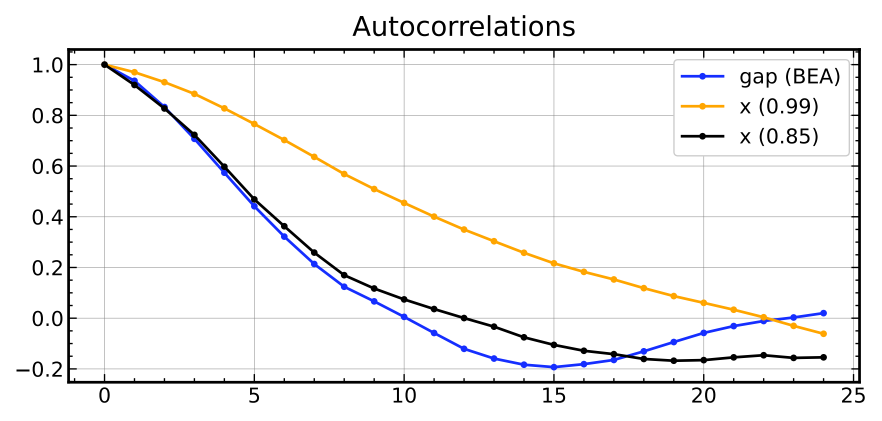
- CPV: habit depends on **stochastically detrended consumption**:

$$x_t = c_t - (1-\phi)\sum_{j=0}^{\infty} \phi^j c_{t-1-j}$$

- Equilibrium: x_t = log output gap
- Calibration: $\phi = 0.99$
- Compare x_t constructed from consumption to BEA output gap

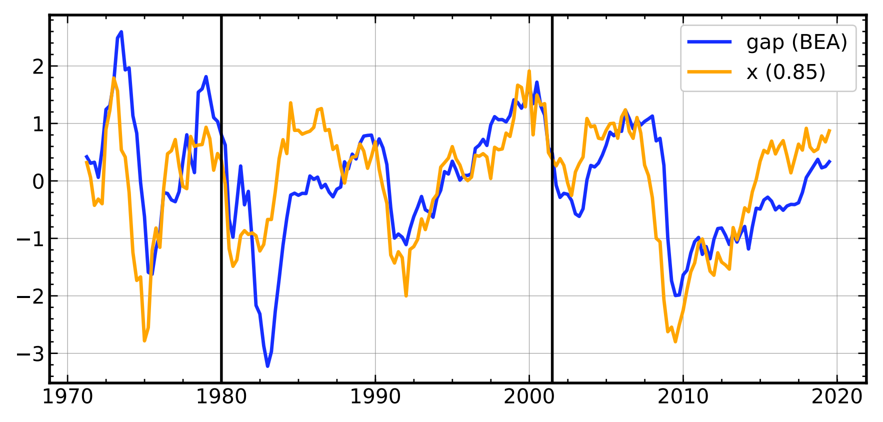


Persistence of x_t and output gap



- BEA output gap is significantly less persistent than x_t with $\phi = 0.99$
- $\phi = 0.85$ matches persistence better

Persistence: $\phi = 0.85$ instead of $\phi = 0.99$



- Better fit for $\phi = 0.8$ than for $\phi = 0.99$
- How does lower ϕ effect model results?
- Next: asset prices

Questions

- Yield spread 2001-2019
  - Model: –0.58% yields curve is on average inverted
  - Data: 2.06%, postwar high in early 2000s and early 2010s (> 3%)
- Can the model capture the secular decline of (long) yields starting in 1982?
- Are consumption/dividend growth forecastable by P/D (or consumption surplus ratio)?
- Campbell-Cochrane habit: increasing **term structure of equity** → **growth premium**
- Interpretation of demand/supply shocks:
  - Model assumes no investment → $C_t = Y_t$
  - "Demand" shock, or **real interest rate shock**?

Suggestions

- Matching moments is useful but how about time series fit?
  → Plot **fitted** P/D and $Y_{n,t}$
- Plot **realized** supply/MP/demand shocks (mean zero?)
- Show IRF of consumption surplus ratio s_t ($\approx$ RRA)
- Expected returns depend on s_t: use s_t as a forecasting variable for realized returns
- Plot s_t and $P/D, Y_{n,t}$
- How about pre-1979 period?