Monetary Policy and Bond Risk Premia

Buraschi, Carnelli, and Whelan

- Any term structure model can be written as

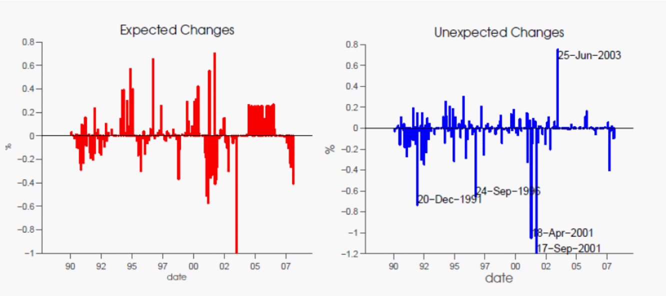
$$P_t^{(n)} = E_t^Q \left[- \int_t^{t+n} r(s) ds \right]$$

thus, both institutional features (short rate as a policy instrument) and economic restrictions (no arbitrage) enforce a fundamental link between monetary policy and entire term structure of interest rates.

- Indeed, there is a high-frequency empirical evidence about bond yields reacting to *CB* announcements: Kuttner (2001), Cochrane and Piazzesi (2002), Piazzesi and Fleming (2005), Gurkaynak et.al. (2005), Bernanke and Kuttner (2005).

Fomc shocks and Bond Yields

- Bernanke and Kuttner (2005) use future on Fed fund to decompose changes in Fed target into 2 components: (a) expected change; (b) unexpected change



Expected vs Unexpected Changes						
expected	0.15	0.10	0.05	0.00	−0.02	−0.04
	(5.84)	(5.75)	(1.56)	(0.02)	(−0.73)	(−1.44)
unexpected	0.30	0.29	0.22	0.15	0.11	0.04
	(6.15)	(5.50)	(3.70)	(2.52)	(2.23)	(1.12)
R^2	0.50	0.50	0.30	0.13	0.10	0.04

Low Frequency:

- However, the evidence in the low frequency literature has not been strong. This is not surprising if you believe Fama (2014) argument that the Fed cannot affect bond markets.
- In this paper, we argue that the answer depends on:
  - Way in which the question has been framed.
  - Way policy innovations have been identified empirically.
- We set to study whether there is a link between monetary policy and bond risk premia (not just returns under the physical P measure, as in Fama (2014)) and we shift the focus from (short-term) target shocks to (long-term) path shocks.

- Measuring exogenous component of monetary policy is challenging:
  1. A significant component of policy actions reflects the endogenous response of the CB, rather than exogenous actions. This requires identifying assumptions (e.g. orthogonalization a' la Christiano, Eichenbaum, and Evans (1999).
  2. Short-term target changes are unlikely to capture the richness of policy decisions.

The current funds rate imperfectly measures policy stimulus because the most important economic decisions, such as a family's decision to buy a new home or a firm's decision to acquire new capital goods, depend much more on longer-term interest rates, such as mortgage rates and corporate bond rates, than on the federal funds rate. Long-term rates, in turn, depend primarily not on the current funds rate but on how financial market participants expect the funds rate and other short-term rates to evolve over time.' (Bernanke (2004b)).

Monetary policy shocks

- Taylor rules allow isolating the exogenous dynamics of policy:

$$f_t = \underbrace{\rho(L) f_{t-1}}_{Inertia} + (1-\rho)\underbrace{[f + \beta(\pi_{t+1} - \pi^*) + \gamma x_{t+k}]}_{Systematic\ \ component} + \underbrace{u_t}_{Target\ component}$$

- Conceptually easy to estimate but problems:
  - One more curse of endogeneity: the CB may react to market *expectations* as well.
  - Shocks at the zero lower bound imply negative nominal rates. Hard to interpret.
  - Is there a link between u_t and risk premia?

- Remember? [...] *Long-term rates, in turn, depend primarily not on the current funds rate but on how financial market participants expect the funds rate and other short-term rates to evolve over time.*' (Bernanke (2004b))
- Thus

$$E_t\left[f_{t+h}\right] = E_t[\underbrace{\rho(L)f_{t+h-1}}_{\textit{Expected}\ \text{Inertia}}] + E_t[(1-\rho)\underbrace{(f+\beta(\pi_{t+h+j}-\pi^*)+\gamma x_{t+h+j})}_{\textit{Expected}\ \text{Systematic component}}]$$
$$+ \underbrace{E_t(u_{t+h})}_{\textit{Expected Target (shock-process)}}$$

- We focus on $E_t(u_{t+h})$.
- Exogenous shock to FUTURE target rates expected today . . . Bernanke
- PATH shock-process!
  - Notice that this is a *process*, not a shock in the traditional sense
  - But how do we get the expectation to estimate the rule?!

DATA

- We exploit a very cool data set of expectations data
- BCFFS:
  - 1990:1 to 2011:12
  - Monthly frequency
  - By 40+ participants on average
  - For 4/5 quarterly horizons
  - Forecasted variables: GDP, INF, FF (all we need for Taylor rules!) plus yields on Treasuries and Mortgages
  - 750,000 data points of named contributors hand collected in joint venture with Fed
- This unique dataset allows us identifying PATH SHOCKS

How Good Are Subjective Forecasts?

- $Var(1)$ on $[f_t; g_t; cpi_t]$; estimated recurs: 25 years rolling window.

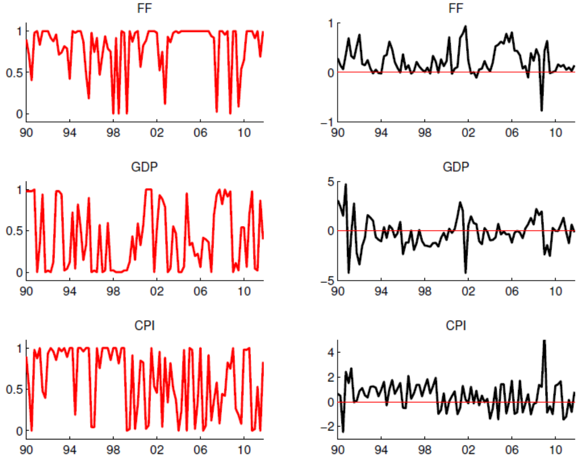


Figure 1. The Performance of BCFFS Forecasts
The figure plots the time series of the number of agents in the cross-section whose forecast error is, in absolute value, less than the absolute value of the VAR forecast error (left panels), and the difference between the absolute value of the VAR forecast error and the absolute value of the average BCFFS forecast error (right panels). Forecast horizon: one quarter.

Estimation of Path Shocks

- Forecast of variable Z by agent n at time t for horizon n.

$$Z^e_{n,t,h} = E\left[Z_{t+h},\right]$$

- In general, the Taylor rule we estimate is

$$f^e_{n,t,h} = \rho_1 f^e_{n,t,h-1} + \rho_2 f^e_{n,t,h-2} + (1-\rho_1-\rho_2)(f + \beta(\pi^e_{n,t,i} - \pi^*) + \gamma x^e_{n,t,i}) + u^e_{n,t,i}$$

- Alternative estimation methods:
  1. Consensus, via OLS;
  2. Panel data: (i) pooled OLS (POLS); (ii) fixed effects (FE); (iii) random effects (RE).

- We proceed with panel estimation and find FE model dominates statistically

Time Series of Path Shocks

Let $PathShock = \frac{1}{N}\sum_{n=1}^{N} u^e_{n,t,h}$; different specification actually lead to similar results. We'll use Specification 1.

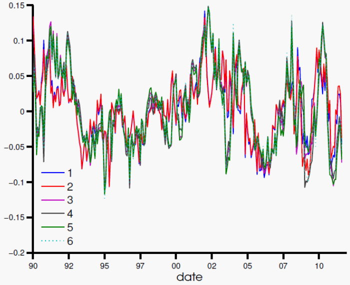


Figure 2. *PathShock*
This figure plots monetary policy path shocks *PathShock*, constructed as cross-sectional averages of the residuals from Taylor rules estimated over a panel of forecast data. Each series corresponds to one of the 6 specifications described in Table I. Sample period: 1990:1 - 2011:7.

- Three approches in the literature:

  1. Christiano, Eichenbaum, and Evans (1996) use a monthly VAR approach: $BZ_t = A(L)Z_{t-1} + \Sigma\eta_t$. To identify the shocks, order by $Z_t = [EMP_t; CPI_t; PCOM_t; FF_t]$. So that FF_t has no contemporaneous effects on Z_t.

  $$\eta_t^{cce} = i_4\Sigma^{-1}\left[BZ_t - A(L)Z_{t-1}\right]$$

  2. Bernanke and Kuttner (2005) use daily innovations in futures on Fed fund rates

  $$\eta_t^{bk} = \frac{D}{D-d}(f_{m,d}^0 - f_{m,d-1}^0)$$

  3. Cochrane and Piazzesi

  $$\eta_t^{cp} = e_{m,d} - e_{m,d-1}$$

- Limitation of η_t^{cce}: it relies on a time-invariant VAR structure. If policy weights change, VAR parameters may change.
- Limitation of η_t^{bk} and η_t^{cp}: they capture short-term target shocks, as opposed to path shocks.

Comparing Shocks with our Process

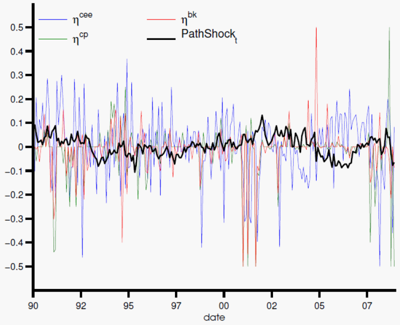


Figure 3. Comparing Shocks:
Figure plots $\mathcal{P}athShock$ against three proxies for target shocks proposed by the literature: (*i*) the residuals in a monthly orthogonalised VAR (η_t^{cee}); (*ii*) the 1-day change in the 3 month euro-dollar rate around FOMC announcements (η_t^{cp}); and (*iii*) the 1-day change in the 1-month Federal funds futures rate around FOMC announcements (η_t^{bk}).

Path vs. Target Shocks

Table II. Path Shocks vs Target Shocks

Table reports results of a regression of $\mathcal{P}athShock_t$ on test three proxies for target shocks that have been studied in the literature: (i) the residuals in a monthly orthogonalised VAR (η_t^{cee}); (ii) the 1-day change in the 3 month euro-dollar rate around FOMC announcements (η_t^{cp}); and (iii) the 1-day change in the 1-month Federal funds futures rate around FOMC announcements η_t^{bk}. Panel A reports loadings, t-statistics (White standard errors) and R^2 from

$$\mathcal{P}athShock_t = \alpha + \beta\ \eta_t^i + \varepsilon_t$$

while Panel B reports regressions of $PackShock_t$ on a 6-month moving sum of past η_t^i shocks

$$\mathcal{P}athShock_t = \alpha + \beta \sum_{k=1}^{6} \eta_{t-k+1}^i + \varepsilon_t$$

	η_t^{cee}	η_t^{cp}	η_t^{bk}
		Panel A	
β	-0.04	-0.03	-0.04
t-stat	(-2.03)	(-0.99)	(-4.70)
R^2	0.02	0.01	0.03
		Panel B	
β	-0.02	-0.06	-0.03
t-stat	(-2.77)	(-4.97)	(-4.43)
R^2	0.06	0.15	0.10

Path Shocks: Counter-cyclical w.r.t. Macro Activity

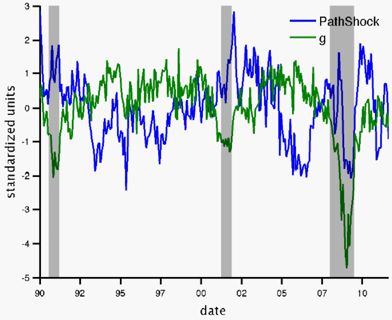


Figure 4. Counter-cyclicality of ***PathShock***
This figure plots monetary policy path shocks *PathShock* (specification 1), and macroeconomic activity, *g*. Areas shaded in gray indicate NBER recessions. Sample period: 1990:1 - 2011:7. Time series are standardised for easy comparison.

- While target shocks are pro-cyclical, *PathShock* are counter-cyclical.
- This suggests that agents expects monetary policy deviations in stance to be short lived.

Path Shocks and Risk Premium Proxies

Table III. Risk Premium Proxies

The table reports the results from regressions of $\mathcal{P}athShock$ on bond risk premia proxies extracted from date t yield curve information:

$$\mathcal{P}athShock_t = const. + \beta Z_t' + \epsilon_t$$

The proxies for yield based risk premium proxies Z_t are the slope of the yield curve as in Campbell and Shiller (1991) ($Slope_t = y_t^{(5)} - y_t^{(1)}$), the forward rate factor of Cochrane and Piazzesi (2005) (CP_t), and the two volatility factors estimated by Le and Singleton (2013) ($LS1_t$ and $LS2_t$). T-statistics, reported below in parenthesis are corrected for auto-correlation and heteroskedasticity using Newey-West errors (18 lags). Both left and right hand variables are standardized. A constant is included but not reported. Sample period: 1990:1 - 2007:12.

	$Slope_t$	CP_t	$LS1_t$	$LS2_t$	R^2
β	0.29				0.08
t-stat	(2.19)				
β		0.36			0.12
t-stat		(3.03)			
β			0.06	0.52	0.23
t-stat			(0.32)	(2.94)	

Path Shocks and Risk Premium Proxies

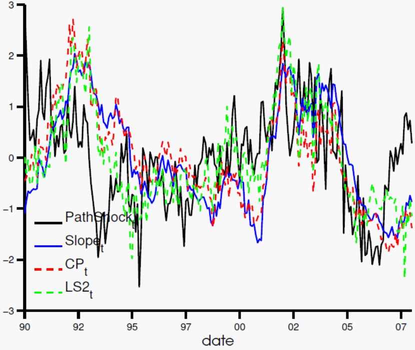


Figure 5. Monetary policy shocks and yield curve information
This figure plots $\mathcal{P}athShock$ against three risk premium proxies: (i) the slope of the yield curve $Slope_t = y_t^{(5)} - y_t^{(1)}$; (ii) the forward rate factor of Cochrane and Piazzesi (2005) (CP); and (iii) a volatility factor from Le and Singleton (2013) $(LS2)$.

Predictability Regressions

	1990-2011		1990-2007	
n	$\mathcal{P}ath\mathcal{S}hock$	$\bar{R}^2$	$\mathcal{P}ath\mathcal{S}hock$	$\bar{R}^2$
2	0.38	14.00%	0.40	15.53%
	(3.13)		(3.07)	
3	0.37	13.73%	0.39	14.62%
	(3.19)		(3.00)	
4	0.38	14.05%	0.38	13.70%
	(3.35)		(2.89)	
5	0.35	12.05%	0.35	12.00%
	(3.19)		(2.77)	

- Our $\mathcal{P}ath\mathcal{S}hock$ already accounts for systematic activity via output gap x_t.
- At the same time, it is known that real economic activity has important predictive power (Ludvigson and Ng (2009)).
- Thus, to evaluate the marginal contribution of $\mathcal{P}ath\mathcal{S}hock$, we also control for a real activity factor g_t from the 1*st* PC of large panel (104) of macro indicators.
- This is different than (and in addition to) the real argument of the Taylor rule (which is *output gap* x_t)

	1990-2011			1990-2007		
n	$\mathcal{P}ath\mathcal{S}hock$	g	$\bar{R}^2$	$\mathcal{P}ath\mathcal{S}hock$	g	$\bar{R}^2$
2	0.35	-0.31	22.97%	0.23	-0.40	28.04%
	(3.32)	(-2.70)		(1.85)	(-4.24)	
3	0.35	-0.28	21.16%	0.25	-0.32	22.54%
	(3.30)	(-2.89)		(1.95)	(-3.57)	
4	0.36	-0.23	18.89%	0.26	-0.26	18.78%
	(3.27)	(-2.41)		(2.00)	(-3.00)	
5	0.33	-0.20	15.90%	0.27	-0.19	14.45%
	(3.10)	(-2.50)		(2.08)	(-2.32)	

Path Shocks and Expected Inflation

- Our $\mathcal{P}ath\mathcal{S}hock$ control for expected inflation. However, expected inflation can be endogenous to the monetary policy shocks. Gallmeyer, Hollifield, Palomino, and Zin (2007a) discuss an economy with recursive preferences and monetary policy. In this economy inflation is endogenous to the Taylor rule.
- Moreover, to the extent that monetary policy affects inflation and inflation is priced in nominal bond returns, $\mathcal{P}ath\mathcal{S}hock$ may affect bond returns through an inflation channel.

	1990-2011			1990-2007		
n	$\mathcal{P}ath\mathcal{S}hock$	$E[\pi_t]$	$\bar{R}^2$	$\mathcal{P}ath\mathcal{S}hock$	$E[\pi_t]$	$\bar{R}^2$
rx(2)	0.35	0.29	0.22	0.39	0.39	0.30
	(2.94)	(2.36)		(3.20)	(3.05)	
rx(3)	0.36	0.21	0.18	0.38	0.32	0.25
	(2.95)	(1.64)		(2.88)	(2.45)	
rx(4)	0.36	0.18	0.17	0.37	0.31	0.23
	(3.12)	(1.43)		(2.74)	(2.35)	
rx(5)	0.34	0.12	0.13	0.35	0.28	0.19
	(3.01)	(0.93)		(2.59)	(2.10)	

The Zero Bound

- Significance of $\mathcal{P}ath\mathcal{S}hock$ is largely unaffected by inclusion 2008-2011.
- Surprising! Fed fund rate has lost its effectiveness at zero-bound.
- Fed introduced (a) Forward guidance; (b) QE1: late 2008 – late 2009 (purchase of MBS, Treasuries, and Agency); QE2: mid 2010 – mid 2011 (LT Treasuries)
- Criticisms, however, do not apply to residuals from Taylor rules estimated over expected *future* federal funds, i.e. $\mathcal{P}ath\mathcal{S}hock$.
    1. Despite the 0%-0:25% range imposed by the Fed onto current Fed funds rates since Dec 2008, expected future Fed funds rates very volatile over the same period (see plot of $\mathcal{P}ath\mathcal{S}hock$).
    2. $\mathcal{P}ath\mathcal{S}hock$ is, by construction, a measure of the exogenous variation in forward guidance.
- As a consequence, $\mathcal{P}ath\mathcal{S}hock$ is particularly suitable to measure exogenous monetary policy shocks in the recent monetary environment.

- 4 proxies: "By how much do agents *expect* that Treasury or mortgage spreads will rise?" and how much are these proxies correlated with $\mathcal{P}athShock$?
  - (a,b,c) TS5Y, TS10Y, TS30Y: consensus increase in the spread between 5-, 10-, and 30-years Treasury yields and the FF rate
  - (d) MTGS: consensus increase in the spread between a benchmark mortgage yield rate and the 30 years Treasury yield

Table VII. $\mathcal{P}athShocks$ **and QE path shocks**

The table reports the correlation of $\mathcal{P}athShocks$ with four measures of QE path shocks: $TS5y$, $TS10y$, $TS30y$, and $MTGS$. The first, second, and third rows report the pairwise correlations for the full, pre-QE (up until November 2008), and QE sample (after November 2008), respectively.

Sample period	$TS5y$	$TS10y$	$TS30y$	$MTGS$	$nobs$
Full sample	-0,21	-0,28	-0,31	0,20	264
Pre-QE	-0,06	-0,14	-0,19	0,09	226
During QE	-0,83	-0,91	-0,89	0,43	38

The Equity Market

- Motivation: out-of-sample test
- Monetary policy may affect real variables (corporate earnings). Effect unequal across horizons and industries. Companies may have different cash flow duration: if monetary policy affects only short term GDP growth, growth companies may be the least affected by tightening cycles.
- If investors cannot diversify away this exposure... this risk is pricedin the cross-section
- Mimicking portfolios for monetary policy path shocks

$$
\begin{aligned}
rx_t^i &= const + \beta_{PS}^i PathShock_t + \varepsilon_t^i \\
mps_t^i &= \frac{1}{10} \sum_{i \in Top} rx_t^i - \frac{1}{10} \sum_{i \in Bottom} rx_t^i
\end{aligned}
$$

The Cross-section of Equity Returns

- Given the mps_t factor, proceeds as in Fama-French. In First-pass: $rx_t^i = \alpha^i + \beta^i_{mkt} mkt_t + \beta^i_{smb} SmB_t + \beta^i_{hml} HmL_t + \beta^i_{mps} mps_t + \varepsilon^i_t$
- Second-pass regression: identify the price of risk $\overline{rx}_t^i = \alpha^i + \lambda_{mkt}\beta^i_{mkt} + \lambda_{smb}\beta^i_{smb} + \lambda_{hml}\beta^i_{hml} + \lambda_{mps}\beta^i_{mps} + \varepsilon^i_t$

Table VIII. Monetary Policy Shocks and Equity Returns

The table reports risk premium estimates (λ) for the 4-factor equity asset pricing model $E\left[RX^i\right] = \beta^{i\prime}\lambda$. The candidate risk factors are the market excess return (mkt), Fama and French (1993) value and size factors (smb and hml) and the portfolio mimicking monetary policy shocks (mps):

$$\beta^{i\prime} = \left[\beta^i_{mkt} \quad \beta^i_{smb} \quad \beta^i_{hml} \quad \beta^i_{mps}\right]'$$
$$\lambda' = \left[\lambda_{mkt} \quad \lambda_{smb} \quad \lambda_{hml} \quad \lambda_{mps}\right]'$$

Factor betas are estimated in first-stage time series regressions via OLS. For each specification: the first row reports (annualized) risk premia estimates; the second row reports t-statistics corrected for auto-correlation and heteroskedasticity using Newey-West errors (18 lags); the third row reports t-statistics that employ Shanken (1992) correction. Sample period: 1990:1 - 2011:7.

mkt	smb	hml	mps
5.99%	2.52%	3.79%	4.40%
(8.69)	(4.52)	(2.90)	(5.03)
(1.77)	(0.95)	(1.50)	(2.17)

Fama-French Portfolios and their Exposure to PathShocks

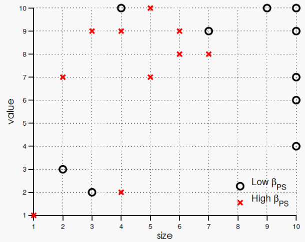


Figure 10. Constituents of *mps*
This figure illustrates the size and value characteristics of the test assets used to construct the mimicking portfolio for monetary policy shocks (specification 1). Black circles (red crosses) indicate the assets with the lowest (highest) sensitivity to monetary policy shocks.

- Value stocks have high β_{ps}; Growth stocks less sensitive to *PathShocks*
- Large companies have low β_{ps}

Channels?

- Predictability: Risk premia are time-varying because of either (1) the price or (2) quantity of risk.

  1. **Habit economies**:
     External habit: In CC (1999), price of risk varies endogenously. However, it cannot explain our result since price of risk depends on current surplus (i.e. past consumption). Path shocks are an expectation of future policy decisions.

     Internal habit: If monetary policy is distortionary, $u(t)$ may affect the price of risk. Example: (a) $U_t(C_t, C_{t+1}, ...) = E_t\left[\sum_{j=0}^{\infty} e^{-\delta j} \frac{(C_{t+j}/H_{t+j})^{1-\gamma}}{1-\gamma}\right]$; $(b)\ H_t = hC_{t-1}$; $E_t\left[C_{t+1}^{\theta}\right] = C_{t+1}^{\theta} e^{-\theta\kappa u_t + 0.5\theta\sigma_c^2}$
  2. **Long-run Risk**. If monetary policy shocks have an impact on macroeconomic uncertainty, $u(t)$ may induce predictability. Indeed, many economists have called for the use of policy instruments and communication to address macroeconomic uncertainty (forward guidance).

Empirical Proxies

1. Habit proxy: We define $s_t = \sum_{j=1}^{120} \Delta c_{t-j}$, with ϕ calibrated to match autocorrelation of P/D ($\phi = 0.97^{1/3}$)
2. LRR proxy: We run a GARCH on the *Expectations* of 1-year ahead GDP and CPI growth (after demeaning the original series by ARMA(1,1).

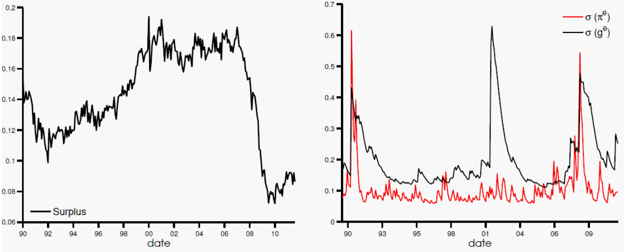


Figure 6. Habit

The left panel of this figure plots a proxy of consumption surplus, s_t, defined as $s_t = \sum_{j=1}^{120} \phi^j \Delta c_{t-j}$, where $\phi = 0.97^{1/3}$ and Δc_t is the (log) consumption growth between month $t-1$ and t. Consumption data consist of seasonally adjusted, real per-capita consumption of nondurables and services.

The right panel plots the conditional volatilities implied by an ARMA(1, 1)-GARCH(1, 1) model fitted to 1-year consensus forecasts of GDP growth ($g^e_{C,t,1Y}$) and inflation ($\pi^e_{C,t,1Y}$). These are proxies for the conditional volatilities of expected GDP and inflation, which we denote $\sigma_t(g^e_{C,t,1Y})$ and $\sigma_t(\pi^e_{C,t,1Y})$, respectively.

- $\mathcal{P}athShock$ fails to explain future surplus:

Table IX. Monetary Policy Shocks and Surplus

The table reports the output from regressions of consumption surplus at time $t+h$ (s_{t+h}) on expected monetary policy shocks at time t:

$$s_{t+h} = const. + \beta \mathcal{P}athShock_t + \epsilon_{t+12}$$

Forecasting horizons (h) range from 1 to 5 years. T-statistics, reported below the point estimates, are corrected for auto-correlation and heteroskedasticity using Newey-West errors (lags equal to h). $\bar{R}^2$ is the adjusted R^2. Both left and right hand variables are standardized. A constant is included but not reported.

h	$\mathcal{P}athShock$	$\bar{R}^2$
1	−0.01	0.00
	(−0.09)	
2	0.02	0.00
	(0.13)	
3	0.16	0.02
	(0.83)	
4	0.29	0.04
	(1.21)	
5	0.11	0.01
	(0.50)	

Path Shocks and Long-Run Risk

- $\mathcal{P}ath\mathcal{S}hocks$ strongly correlated with contemporaneous real uncertainty.
- About 20% of the variance of $\sigma(E_t g)$ is explained by $\mathcal{P}ath\mathcal{S}hocks$:

	$\mathcal{P}ath\mathcal{S}hock$	$\bar{R}^2$
$\sigma\left(g^e\right)$	0,46	20,50%
	3,27	
$\sigma\left(\pi^e\right)$	0,15	2,00%
	0,98	

- Is the role of $\mathcal{P}ath\mathcal{S}hocks$ subsumed by the LRR? No.

Table XI. Monetary Policy Shocks versus Uncertainty

The table reports the output from regressions of annual bond excess returns on monetary policy path shocks, controlling for the level of macroeconomic activity and uncertainty:

$$rx_{t+12}^{(n)} = const. + \beta_{PS}^{(n)} \mathcal{P}ath\mathcal{S}hock_t + \beta_g^{(n)} g_t + \beta_{\sigma(g)}^{(n)} \sigma_t\left(g^e\right) + \beta_{\sigma(\pi)}^{(n)} \sigma_t\left(\pi^e\right) + \epsilon_{t+12}^{(n)}$$

Bond maturities (n) range from 2 to 5 years. T-statistics, reported below the point estimates, are corrected for auto-correlation and heteroskedasticity using Newey-West errors (18 lags). $\bar{R}^2$ is the adjusted R^2. Both left and right hand variables are standardized. A constant is included but not reported.

n	$\mathcal{P}ath\mathcal{S}hock$	g	$\sigma\left(g^e\right)$	$\sigma\left(\pi^e\right)$	$\bar{R}^2$
2	0.30	−0.23	0.16	−0.02	0.24
	(2.47)	(−1.88)	(1.30)	(−0.23)	
3	0.28	−0.17	0.23	−0.03	0.24
	(2.27)	(−1.58)	(1.98)	(−0.50)	
4	0.27	−0.11	0.27	−0.05	0.22
	(2.19)	(−1.15)	(2.46)	(−0.82)	
5	0.25	−0.08	0.28	−0.05	0.20
	(1.98)	(−0.88)	(2.81)	(−0.90)	

Conclusions

- Novel proxy of monetary policy $\mathcal{P}ath\mathcal{S}hocks$.
- Monetary Policy not only affects long term interest rates via setting the short rate (physical measure) but also affects the cross-section of bonds through risk compensation.
- Important implications for the standard transmission mechanism. Monetary policy should indeed be concerned about "communication" and forward guidance could have (coeteris paribus) value.
- 'Out-of-Sample' evidence suggests Monetary policy is also priced in the cross-section of stocks.
- The underlying economic channel is linked to a time-varying price of risk story rather than a time-varying quantity of risk.

Thanks

Excess Returns, Habit and LRR

Table XV. Excess Returns, Habit and LRR

The table reports the output from regressions of annual bond excess returns on proxies (x_t) of consumption surplus and long run risk:

$$rx_{t+12}^{(n)} = const. + \beta^{(n)} x_t + \epsilon_{t+12}^{(n)}$$

Bond maturities (n) range from 2 to 5 years. The proxies are: consumption surplus (s), GDP growth uncertainty ($\sigma(g^e)$), inflation uncertainty ($\sigma(\pi^e)$).T-statistics, reported below the point estimates, are corrected for auto-correlation and heteroskedasticity using Newey-West errors (18 lags). $\bar{R}^2$ is the adjusted R^2. Both left and right hand variables are standardized. A constant is included but not reported.

	Habit		LRR			Habit and LRR			
n	s	$\bar{R}^2$	$\sigma(g^e)$	$\sigma(\pi^e)$	$\bar{R}^2$	s	$\sigma(g^e)$	$\sigma(\pi^e)$	$\bar{R}^2$
2	-0,08	0,22%	0,37	0,04	14,94%	0,04	0,38	0,05	14,76%
	(-0,46)		(3,03)	(0,53)		(0,26)	(3,75)	0,60	
3	-0,09	0,39%	0,41	0,01	16,83%	0,03	0,42	0,01	16,61%
	(-0,50)		(3,64)	(0,09)		(0,24)	(4,34)	(0,14)	
4	-0,14	1,47%	0,42	-0,04	16,13%	-0,03	0,42	-0,04	15,87%
	(-0,87)		(3,82)	(-0,42)		(-0,20)	(4,15)	(-0,45)	
5	-0,17	2,46%	0,41	-0,05	15,08%	-0,07	0,40	-0,05	15,16%
	(-1,34)		(3,98)	(-0,62)		(-0,53)	(4,00)	(-0,71)	