

Dynamics of Monetary Policy Uncertainty and the Macroeconomy

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“Improving the public’s understanding of the central bank’s objectives and policy strategies reduces economic and financial uncertainty and thereby allows business and households to make more informed decisions.”

~ Ben S. Bernanke, Chairman of the Federal Reserve
Speech to the Cato Institute 25th Annual Monetary Conference,
November 17, 2007.

“The more fully the public understands what the function of the Federal reserve system is and on what grounds and on what indications its policies and actions are based, the simpler and easier will be the problems of credit administration in the United States.”

~ Federal Reserve Board, Annual Report, 1923, p. 38.

Purpose

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Federal Reserve lacks transparency

- Evidence suggests transparency leads to greater stability and better macroeconomic outcomes.
- Dual mandate - what is the relative importance of price stability versus maximum employment?
- Magnitude of interest rate responses?

Purpose

Measure monetary policy uncertainty (MPU); measure effect on:

- 1 The *level* of output, employment, and inflation.
- 2 The *volatility* output, employment, and inflation.

Monetary Policy Overview

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- The Federal Reserve influences interest rates:
 - ① An increase in money supply causes an increase in supply of loanable funds
 - ② An increase in supply of loanable funds causes interest rates on loans to fall.
- Interest rates influence economic activity.
- Monetary Policy: using interest rates to achieve macroeconomic goals.

Addressing Unemployment / Output Growth

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Problem: Suppose unemployment is high
(or growth in production is low):

- 1 The Fed increases the supply of money.
- 2 Interest rates fall.
- 3 Lower interest rates encourage more borrowing and less saving, and therefore more spending.
- 4 The increase in economic activity causes an increase in production and employment.
- 5 **Yay!**

Addressing Inflation

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Problem: Suppose inflation is high:

- 1 The Fed decreases the supply of money.
- 2 Interest rates rise.
- 3 Higher interest rates encourages saving, discourages borrowing, leads to decreases in spending.
- 4 Lower demand for goods and services leads to downward pressure on prices.
- 5 **Yay!**

Taylor Rule

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- When unemployment goes up \rightarrow lower interest rates.
- When output growth goes down \rightarrow lower interest rates.
- When inflation goes up \rightarrow raise interest rates.
- Interest rates are persistent.

Taylor Rule

Taylor (1993) suggested U.S. Monetary Policy follows a rule similar to...

$$r_t = \alpha_0 + \alpha_r r_{t-1} + \alpha_\pi \pi_{t-1} + \alpha_g g_{t-1} + \alpha_u u_{t-1} + \epsilon_t$$

Variables:	Coefficients:
Subscript t denotes time period. r_t : Federal Funds rate π_t : inflation rate g_t : growth rate u_t : unemployment rate. ϵ_t allows for unexplained variation.	α_π : response of interest rate to inflation. α_π : response of interest rate to inflation. α_g : response of interest rate to growth. α_u : response to unemployment. α_0 : related to average interest rate.

Monetary Policy Uncertainty

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- How well do we understand the conduct of monetary policy?
- *How much* does the interest rate change in response to the variables mentioned?
- What are the values for the coefficients?

Who Cares?

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- Economic uncertainty can lead to precautionary saving:
 - An increase in saving leads to a decrease in spending, production, and employment.
- Economic uncertainty can lead to less economic stability:
 - Changes in economic policy or economic conditions can trigger larger, self-fulfilling expectations.
- Federal Reserve has a non-specific, dual mandate, “Promote stability in employment and prices.”

Empirical Evidence for Transparency and Credibility 11/ 22

- Cecchetti and Krause (2002)
 - 60 countries
 - Transparency and credibility leads to greater macroeconomic stability.
- Cecchetti, Flores-Langunes, and Krause (2006)
 - 20 countries
 - Better monetary policy explains 80% reduction in macroeconomic volatility since early 1980s.
- Cecchetti and Ehrmann (2002) - world
Bernanke and Mishkin (1997) - United States
 - Policy focus on inflation stability leads to greater inflation and output stability.

Empirical Evidence for Inflation Uncertainty

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- Grier and Perry (2000); Fountas (2001); Fountas, Karanasos, and Kim (2002, 2006), Grier et al. (2004), Fountas and Karanasos (2007)
- Find inflation uncertainty (as evidenced of from changing volatility) decreases output growth.
- Do not focus specifically on uncertainty caused by *monetary policy*.
- Do not separate uncertainty from volatility.

Uncertainty in U.S. Monetary Policy

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- Taylor (1993) rule reasonably approximates theory and practice of monetary policy behavior.
- Taylor rule coefficients change.
 - Taylor (1999), Clarida, Gali, and Gertler (2000), Orphanides (2003)
- Interest rate smoothing, stronger response to output growth, lower trend inflation.
 - Coibion and Gorodnichenko (2009)

What are the Taylor Rule Coefficients?

- Taylor (1993) suggested the equation is,

$$r_t = 1 + 1.5\pi_{t-1} + 0.5(GDP_{t-1} - GDP^*)$$

- How about estimate the equation using a linear regression?

$$r_t = \alpha_0 + \alpha_r r_{t-1} + \alpha_\pi \pi_{t-1} + \alpha_g g_{t-1} + \alpha_u u_{t-1} + \epsilon_t$$

OLS Regression (1955:Q2 - 2010:Q2)

	Constant	Prev. Rate	Growth	Inflation	Unemployment
Coefficient	0.166	0.902	0.386	0.400	-0.053
(Std Error)	(0.321)	(0.029)	(0.081)	(0.117)	(0.051)

- Well that's settled.

Seriously.. Uncertainty!

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Least-Squares Learning:

$$r_t = \alpha_0 + \alpha_r r_{t-1} + \alpha_\pi \pi_{t-1} + \alpha_g g_{t-1} + \alpha_u u_{t-1} + \epsilon_t$$

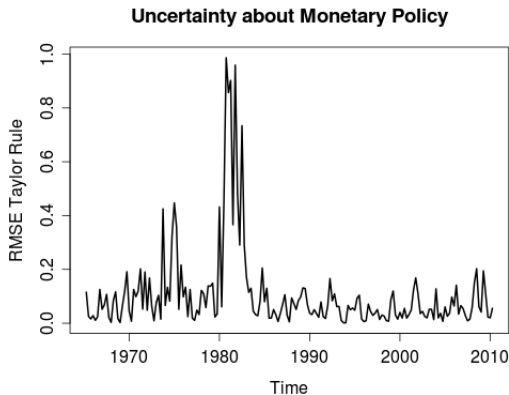
- Supposes every quarter market participants re-estimate the Taylor rule regression with available data.
- Weighted regression: most recent observations are given more weight.

Measure of Monetary Policy Uncertainty (MPU):

- Estimated residuals (errors) from the regression is unexplained monetary policy.
- $MPU_t =$ (Weighted) average of squared-residuals.

Monetary Policy Uncertainty

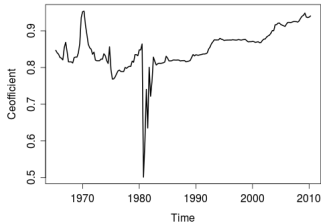
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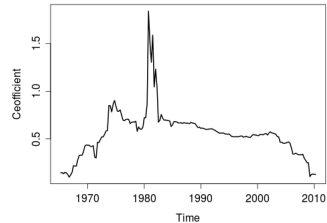
Evolving Estimates of Monetary Policy

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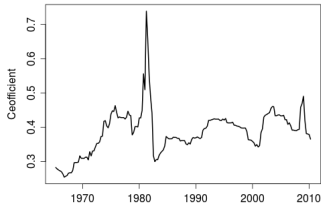
WLS Estimate for Coefficient on Lagged Interest Rate



WLS Estimate for Coefficient on Inflation



WLS Estimate for Coefficient on Output Growth



WLS Estimate for Coefficient on Unemployment



Impact on the Macroeconomy

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Impact of MPU on Levels

- 1 Unemployment,
- 2 Production growth,
- 3 inflation.

Estimate a Vector Autoregression (VAR):

- Statistical model that determines factors that influence...
- unemployment, production growth, inflation,...
- while accounting for co-dependence of these variables...
- *and add the MPU variable.*

Vector Autoregression Results

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Dependent Variable:	Inflation (π_t)		Unemployment (u_t)		Output Growth (g_t)	
Constant	0.338	(0.239)	0.312***	(0.103)	0.296	(0.259)
r_{t-1}	0.064**	(0.026)	0.000	(0.011)	-0.032	(0.026)
g_{t-1}	0.435***	(0.117)	0.013	(0.050)	-0.044	(0.119)
π_{t-1}	0.040	(0.082)	-0.211***	(0.033)	0.313***	(0.085)
u_{t-1}	-0.024	(0.025)	0.967***	(0.013)	0.085**	(0.033)
MPU_t	-0.017	(0.088)	0.070	(0.046)	-0.072	(0.112)
R^2	0.367		0.971		0.175	

Heteroskedastic robust standard errors in parentheses.

* Significant at the 10% level. ** Significant at the 5% level.

*** Significant at the 1% level.

Failure to find statistical significance on MPU implies a failure to find evidence that monetary policy uncertainty affects these variables.

Impact on Economic Volatility

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- Uncertainty may still impact volatility (mean-preserving).
- Movements in monetary policy are unpredictable, cause excessive changes in business and consumer decisions.
- Allow for autoregressive conditional heteroskedasticity (ARCH) and...
- *let MPU influence volatility.*

Autoregressive Conditional Heteroskedasticity

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	Inflation Volatility		Unemployment Volatility		Output Growth Volatility	
Constant	0.321***	(0.109)	0.057***	(0.013)	0.487***	(0.101)
η_{t-1}^2	0.207***	(0.073)	0.086	(0.074)	0.112	(0.075)
MPU_t^2	0.022	(0.015)	0.006***	(0.002)	0.033**	(0.014)
R^2	0.058		0.083		0.053	

¹ Standard errors in parentheses.

* Significant at the 10% level. ** Significant at the 5% level.

*** Significant at the 1% level.

- Monetary policy uncertainty leads to less stability in unemployment and output growth.
- Fail to find evidence monetary policy uncertainty affects inflation volatility.

Conclusions for the Macroeconomy

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- We do not find evidence that MPU affects the *average level* of unemployment, inflation, or output growth.
- We do find evidence that MPU adversely affects the stability of unemployment and output growth.
- Especially important as the Fed is conducted with unprecedented problems, and left with nontraditional policies.