Are People Aware of the Taylor Rule?*

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*The views expressed in this paper are those of the authors and do not necessarily reflect the position of the FRBNY, the FRBSF, or the Federal Reserve System.

Motivation

- Most questions of interest to macroeconomists have a dynamic dimension
- Main reason why issue of expectations formation is important
- In particular, agents' understanding of policy is key (e.g. Taylor Principle)
- Extense empirical literature on how monetary policy is conducted
- Much less (no?) work on question of how agents perceive policy

This paper

- "Are people aware of the Taylor rule?"

- Idea: combine questions from the Michigan Survey about the future path of π_t (p_t), i_t, u_t, and check for "consistency with Taylor rule"
  - Example: $\mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow) > \mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow)$

- Perform same analysis with
  - Survey of Professional Forecasters
  - Artificial surveys filled in by VAR

What we find

- Answers broadly consistent with awareness of Taylor rule
- Degree of awareness not uniform across income and education levels
  - Evidence that Fed's dual mandate is:
    - understood by highest-income and college-degree households
    - not properly understood by lowest-income-quartile and no-high-school-degree households
- Break in (i_t, π_t, u_t) Taylor rule around 1987
  - detected by highest-income and college-degree households
  - undetected by lowest-income and no-high-school-degree households
- Disclaimer: "awareness" just an interpretation

Michigan Survey questions

- About interest rates: "*No one can say for sure, but what do you think will happen to* **interest rates for borrowing money** *during the* **next 12 months**–*will they* **go up, stay the same, or go down***?*"

- About unemployment: "*How about people out of work during the* **coming 12 months**–*do you think that there will be* **more unemployment than now, about the same, or less***?*"

- About **prices**

  – "*During the* **next 12 months**, *do you think that* **prices in general** *will* **go up, or go down, or stay where they are now***?*", and

  – "*By* **about what percent** *do you expect* **prices** *to* **go (up/down)** *on the average, during the* **next 12 months***?*"

Assumptions

- About interest rates:
  - answers to an analogous question about direction of 3-month Treasury Bill rate in 12 months would be the same
- About unemployment
  - pertains to civilian unemployment rate
- About prices
  - pertains to headline Consumer Price Index
  - assume people know 12-month CPI inflation
  - calculate predicted change in 12-month CPI inflation
  - convert to "up/down/same"

Organizing framework

- Start from

$$i_t = \overline{r} + \widetilde{\phi}_\pi \pi_{t-12,t} + \widetilde{\phi}_y \left(y_t - y_t^n \right) + \varepsilon_t$$

Organizing framework

- Start from

$$i_t = \overline{r} + \widetilde{\phi}_\pi \pi_{t-12,t} + \widetilde{\phi}_y \left(y_t - y_t^n \right) + \varepsilon_t$$

- Replace $\left(y_t - y_t^n \right)$ with $\alpha \left(u_t - u_t^n \right)$ (with $\alpha < 0$)

$$i_t = \overline{r} + \phi_\pi \pi_{t-12,t} + \phi_u \left(u_t - u_t^n \right) + \varepsilon_t$$

Organizing framework

- Start from

$$i_t = \overline{r} + \widetilde{\phi}_\pi \pi_{t-12,t} + \widetilde{\phi}_y \left(y_t - y_t^n\right) + \varepsilon_t$$

- Replace $\left(y_t - y_t^n\right)$ with $\alpha \left(u_t - u_t^n\right)$ (with $\alpha < 0$)

$$i_t = \overline{r} + \phi_\pi \pi_{t-12,t} + \phi_u \left(u_t - u_t^n\right) + \varepsilon_t$$

- Subtract from E_t of 12-month lead, and assume $var\left(u_t^n\right) << var\left(u_t\right)$

$$E_t i_{t+12} - i_t \approx \phi_\pi \left[E_t \pi_{t,t+12} - \pi_{t-12,t}\right] + \phi_u \left[E_t u_{t+12} - u_t\right] + \widetilde{\varepsilon}_t$$

Taylor rule orderings

- Taylor rule orderings

$$\begin{aligned}\mathcal{P}\left(i\uparrow \mid \pi\downarrow, u\uparrow\right) &< \left\{\begin{array}{l}\mathcal{P}\left(i\uparrow \mid \pi\downarrow, u\leftrightarrow\right)\\ \mathcal{P}\left(i\uparrow \mid \pi\leftrightarrow, u\uparrow\right)\end{array}\right\} < \mathcal{P}\left(i\uparrow\right)\\ &< \left\{\begin{array}{l}\mathcal{P}\left(i\uparrow \mid \pi\uparrow, u\leftrightarrow\right)\\ \mathcal{P}\left(i\uparrow \mid \pi\leftrightarrow, u\downarrow\right)\end{array}\right\} < \mathcal{P}\left(i\uparrow \mid \pi\uparrow, u\downarrow\right),\end{aligned}$$

Taylor rule orderings

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and

$$\begin{aligned}\mathcal{P}\left(i\downarrow \mid \pi\uparrow, u\downarrow\right) &< \left\{\begin{array}{l}\mathcal{P}\left(i\downarrow \mid \pi\uparrow, u\leftrightarrow\right)\\ \mathcal{P}\left(i\downarrow \mid \pi\leftrightarrow, u\downarrow\right)\end{array}\right\} < \mathcal{P}\left(i\downarrow\right)\\ &< \left\{\begin{array}{l}\mathcal{P}\left(i\downarrow \mid \pi\downarrow, u\leftrightarrow\right)\\ \mathcal{P}\left(i\downarrow \mid \pi\leftrightarrow, u\uparrow\right)\end{array}\right\} < \mathcal{P}\left(i\downarrow \mid \pi\downarrow, u\uparrow\right).\end{aligned}$$

Partial effects

- Of inflation

$$\begin{aligned}
\mathcal{P}\left(i\uparrow \mid \pi\downarrow, u\right) &< \mathcal{P}\left(i\uparrow \mid \pi\leftrightarrow, u\right) < \mathcal{P}\left(i\uparrow \mid \pi\uparrow, u\right), \\
\mathcal{P}\left(i\downarrow \mid \pi\uparrow, u\right) &< \mathcal{P}\left(i\downarrow \mid \pi\leftrightarrow, u\right) < \mathcal{P}\left(i\downarrow \mid \pi\downarrow, u\right),
\end{aligned}$$

Partial effects

- Of inflation

$$\begin{aligned}\mathcal{P}\left(i\uparrow \mid \pi\downarrow, u\right) &< \mathcal{P}\left(i\uparrow \mid \pi\leftrightarrow, u\right) < \mathcal{P}\left(i\uparrow \mid \pi\uparrow, u\right),\\ \mathcal{P}\left(i\downarrow \mid \pi\uparrow, u\right) &< \mathcal{P}\left(i\downarrow \mid \pi\leftrightarrow, u\right) < \mathcal{P}\left(i\downarrow \mid \pi\downarrow, u\right),\end{aligned}$$

- Of unemployment

$$\begin{aligned}\mathcal{P}\left(i\uparrow \mid \pi, u\uparrow\right) &< \mathcal{P}\left(i\uparrow \mid \pi, u\leftrightarrow\right) < \mathcal{P}\left(i\uparrow \mid \pi, u\downarrow\right),\\ \mathcal{P}\left(i\downarrow \mid \pi, u\downarrow\right) &< \mathcal{P}\left(i\downarrow \mid \pi, u\leftrightarrow\right) < \mathcal{P}\left(i\downarrow \mid \pi, u\uparrow\right).\end{aligned}$$

Estimated Taylor rule

- OLS

$$IR_t = \beta_0 + \beta_1 Inflation_t + \beta_2 Unemp_t + u_t,$$

Table 1: Split-sample estimation

	Before 1987	After 1987
Inflation	0.523***	1.025***
	0.048	0.090
Unemployment	0.736***	-0.746***
	0.141	0.110
Nobs	115	257
R^2	0.525	0.388

- Focus on post-87 sample (return to "structural break" later)

Realized data

Table 2: Unconditional distributions (%) – data

	$\downarrow$	$\leftrightarrow$	$\uparrow$
$\mathcal{P}(i)$	56.03	-	43.94
$\mathcal{P}(\pi)$	45.53	-	54.47
$\mathcal{P}(u)$	62.26	3.11	34.63

Table 3: Conditional distributions of $i \mid \pi, u$ (%) – data

	$\downarrow$	$\leftrightarrow$	$\uparrow$	Nobs
$\mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	19.78	-	80.22	91
$\mathcal{P}(i \mid \pi \uparrow, u \leftrightarrow)$	100.00	-	0.00	3
$\mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	100.00	-	0.00	46
$\mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	43.48	-	56.52	69
$\mathcal{P}(i \mid \pi \downarrow, u \leftrightarrow)$	80.00	-	20.00	5
$\mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	100.00	-	0.00	43

Realized data

Table 4: Kolmogorov-Smirnov tests – data

		Test statistic	p-value
(1)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	0.363	0.000
(2)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	0.440	0.000
(3)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	0.126	0.300
(4)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	0.440	0.000

Realized data

Table 5: Taylor rule orderings – data

	Null Hypothesis	t-stat	p-value
(1)	$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow)$	14.17	0.00
(2)	$\mathcal{P}(i \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow)$	6.94	0.00
(3)	$\mathcal{P}(i \downarrow \mid \pi \uparrow, u \downarrow) \geq \mathcal{P}(i \downarrow)$	6.94	0.00
(4)	$\mathcal{P}(i \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \downarrow, u \uparrow)$	14.17	0.00

Realized data

Table 6: Partial effects of inflation – data

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.24	3.23	0.00
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)$	-	-	-
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)$	0.24	3.23	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	-	-	-

Table 7: Partial effects of unemployment – data

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)$	0.57	9.40	0.00
$\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.80	19.10	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.57	9.40	0.00
$\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.80	19.10	0.00

Realized data

Table 8: Ordered probit – data

	Estimates
Inflation	0.311***
	0.104
Unemployment	-1.829***
	0.383

Table 9: Conditional distributions of $i \mid \pi, u$ (%) , ordered probit – data

		$\downarrow$	$\leftrightarrow$	$\uparrow$
(1)	$\mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	20.53	0.00	79.47
(2)	$\mathcal{P}(i \mid \pi \uparrow, u \leftrightarrow)$	84.29	0.00	15.71
(3)	$\mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	99.77	0.00	0.23
(4)	$\mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	42.07	0.00	57.93
(5)	$\mathcal{P}(i \mid \pi \downarrow, u \leftrightarrow)$	94.84	0.00	5.16
(6)	$\mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	99.97	0.00	0.03

Michigan Survey

Table 10: Unconditional distributions (%) – Michigan Survey

	$\downarrow$	$\leftrightarrow$	$\uparrow$
$\mathcal{P}(i)$	15.11	28.64	56.25
$\mathcal{P}(\pi)$	46.13	-	53.87
$\mathcal{P}(u)$	13.84	50.69	35.48

Table 11: Conditional distributions of $i \mid \pi, u$ (%) , – Michigan Survey

		$\downarrow$	$\leftrightarrow$	$\uparrow$	Nobs
(1)	$\mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	13.06	26.46	60.48	7,458
(2)	$\mathcal{P}(i \mid \pi \uparrow, u \leftrightarrow)$	11.16	28.90	59.94	28,465
(3)	$\mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	16.45	22.99	60.56	23,444
(4)	$\mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	15.46	33.01	51.53	7,852
(5)	$\mathcal{P}(i \mid \pi \downarrow, u \leftrightarrow)$	14.75	33.78	51.47	27,848
(6)	$\mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	21.74	26.49	51.77	15,772

Michigan Survey

Table 12: Kolmogorov-Smirnov tests – Michigan Survey

		Test statistic	p-value
(1)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	0.043	0.000
(2)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \leftrightarrow)$	0.040	0.000
(3)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	0.042	0.000
(4)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	0.052	0.000
(5)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \leftrightarrow)$	0.048	0.000
(6)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	0.064	0.000

Michigan Survey

Table 13: Taylor rule orderings – Michigan Survey

	Null Hypothesis	mean difference	t-stat	p-value
(1)	$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow)$	0.04	9.60	0.00
(2)	$\mathcal{P}(i \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow)$	0.04	6.57	0.00
(3)	$\mathcal{P}(i \downarrow \mid \pi \uparrow, u \downarrow) \geq \mathcal{P}(i \downarrow)$	0.02	4.62	0.00
(4)	$\mathcal{P}(i \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \downarrow, u \uparrow)$	0.07	17.48	0.00

Michigan Survey

Table 14: Partial effects of inflation dropping $i \mid \pi, u \leftrightarrow$ – Michigan Survey

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow)$	0.10	11.94	0.00
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \uparrow)$	0.09	16.81	0.00
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \downarrow)$	0.03	4.63	0.00
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \uparrow)$	0.05	12.39	0.00

Table 15: Partial effects of unemployment dropping $i \mid \pi, u \leftrightarrow$ – Michigan Survey

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \downarrow, u \downarrow)$	-0.01	-1.29	0.90
$\mathcal{P}(i \uparrow \mid \pi \uparrow, u \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow)$	0.00	0.07	0.47
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \downarrow, u \uparrow)$	0.06	10.93	0.00
$\mathcal{P}(i \downarrow \mid \pi \uparrow, u \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \uparrow)$	0.03	7.24	0.00

SPF

Table 16: Unconditional distributions (%) – SPF

	$\downarrow$	$\leftrightarrow$	$\uparrow$
$\mathcal{P}(i)$	33.66	-	66.34
$\mathcal{P}(\pi)$	50.15	-	49.85
$\mathcal{P}(u)$	44.06	0.15	55.79

Table 17: Unconditional distributions (%) – SPF

	$\downarrow$	$\leftrightarrow$	$\uparrow$	Nobs
$\mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	16.06	-	83.94	654
$\mathcal{P}(i \mid \pi \uparrow, u \leftrightarrow)$	-	-	-	0
$\mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	43.68	-	56.32	673
$\mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	18.11	-	81.89	519
$\mathcal{P}(i \mid \pi \downarrow, u \leftrightarrow)$	25.00	-	75.00	4
$\mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	49.51	-	50.49	812

SPF

Table 18: Kolmogorov-Smirnov tests – SPF

		Test statistic	p-value
(1)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	0.176	0.000
(2)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	0.100	0.000
(3)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	0.155	0.000
(4)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	0.158	0.000

SPF

Table 19: Partial effects of inflation dropping $i \mid \pi, u \leftrightarrow$ – SPF

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow)$	0.02	0.93	0.18
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \uparrow)$	0.06	2.24	0.01
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \downarrow)$	0.02	0.93	0.18
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \uparrow)$	0.06	2.24	0.01

Table 20: Partial effects of unemployment dropping $i \mid \pi, u \leftrightarrow$ – SPF

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \downarrow, u \downarrow)$	0.31	12.88	0.00
$\mathcal{P}(i \uparrow \mid \pi \uparrow, u \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow)$	0.28	11.55	0.00
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \downarrow, u \uparrow)$	0.31	12.88	0.00
$\mathcal{P}(i \downarrow \mid \pi \uparrow, u \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \uparrow)$	0.28	11.55	0.00

SPF

Table 21: Partial effects of *core* inflation dropping $i \mid \pi, u \leftrightarrow$ – SPF

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \downarrow)$	0.15	2.05	0.02
$\mathcal{P}(i \uparrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow \mid \pi \uparrow, u \uparrow)$	0.10	1.78	0.04
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \downarrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \downarrow)$	0.15	2.05	0.02
$\mathcal{P}(i \downarrow \mid \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \downarrow \mid \pi \uparrow, u \uparrow)$	0.10	1.78	0.04

VAR

Table 22: Unconditional distributions (%) – VAR

	$\downarrow$	$\leftrightarrow$	$\uparrow$
$\mathcal{P}(i)$	15.03	29.02	55.96
$\mathcal{P}(\pi)$	52.33	-	47.67
$\mathcal{P}(u)$	13.47	50.78	35.75

Table 23: Conditional distributions of $i \mid \pi, u$ (%) , – VAR

		$\downarrow$	$\leftrightarrow$	$\uparrow$	Nobs
(1)	$\mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	0.00	0.00	100.00	22
(2)	$\mathcal{P}(i \mid \pi \uparrow, u \leftrightarrow)$	0.00	13.16	86.84	38
(3)	$\mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	28.13	15.63	56.25	32
(4)	$\mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	0.00	0.00	100.00	4
(5)	$\mathcal{P}(i \mid \pi \downarrow, u \leftrightarrow)$	3.33	53.33	43.33	60
(6)	$\mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	48.65	37.84	13.51	37

VAR

Table 24: Kolmogorov-Smirnov tests – VAR

		Test statistic	p-value
(1)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \downarrow)$	0.440	0.000
(2)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \leftrightarrow)$	0.309	0.003
(3)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \uparrow, u \uparrow)$	0.131	0.659
(4)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \downarrow)$	0.440	0.281
(5)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \leftrightarrow)$	0.126	0.392
(6)	$\mathcal{P}(i) = \mathcal{P}(i \mid \pi \downarrow, u \uparrow)$	0.424	0.000

VAR

Table 25: Taylor rule orderings – VAR

	Null Hypothesis	mean difference	t-stat	p-value
(1)	$\mathcal{P}(i \uparrow \vert \pi \downarrow, u \uparrow) \geq \mathcal{P}(i \uparrow)$	0.14	6.31	0.00
(2)	$\mathcal{P}(i \uparrow) \geq \mathcal{P}(i \uparrow \vert \pi \uparrow, u \downarrow)$	1.00	12.29	0.00
(3)	$\mathcal{P}(i \downarrow \vert \pi \uparrow, u \downarrow) \geq \mathcal{P}(i \downarrow)$	0.00	5.83	0.00
(4)	$\mathcal{P}(i \downarrow) \geq \mathcal{P}(i \downarrow \vert \pi \downarrow, u \uparrow)$	0.49	3.86	0.00

Michigan Survey - demographics

Table 26: Partial effects of inflation - lowest income quartile

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.11	5.74	0.00
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)$	0.08	6.76	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)$	0.04	2.51	0.01
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.05	5.06	0.00

Table 27: Partial effects of inflation - highest income quartile

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.09	6.55	0.00
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)$	0.10	10.53	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)$	0.02	2.29	0.01
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.06	7.85	0.00

Michigan Survey - demographics

Table 28: Partial effects of inflation - no high school

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.11	3.97	0.00
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)$	0.11	6.40	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)$	0.03	1.65	0.05
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.05	4.03	0.00

Table 29: Partial effects of inflation - college

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.09	6.80	0.00
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)$	0.09	10.55	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)$	0.03	2.86	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.06	9.34	0.00

Michigan Survey - demographics

Table 30: Partial effects of unemployment - lowest income quartile

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)$	-0.07	-3.77	1.00
$\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	-0.04	-2.32	0.99
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.02	1.54	0.06
$\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.01	0.86	0.19

Table 31: Partial effects of unemployment - highest income quartile

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)$	0.04	3.29	0.00
$\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.03	2.68	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.10	10.61	0.00
$\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.06	6.87	0.00

Michigan Survey - demographics

Table 32: Partial effects of unemployment - no high school

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)$	-0.03	-1.06	0.86
$\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	-0.03	-1.30	0.90
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.03	1.40	0.08
$\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.01	0.37	0.35

Table 33: Partial effects of unemployment - college

Null Hypothesis	mean difference	t-stat	p-value
$\mathcal{P}(i\uparrow\|\pi\downarrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\downarrow,u\downarrow)$	0.03	2.67	0.00
$\mathcal{P}(i\uparrow\|\pi\uparrow,u\uparrow)\geq\mathcal{P}(i\uparrow\|\pi\uparrow,u\downarrow)$	0.03	2.67	0.00
$\mathcal{P}(i\downarrow\|\pi\downarrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\downarrow,u\uparrow)$	0.09	11.19	0.00
$\mathcal{P}(i\downarrow\|\pi\uparrow,u\downarrow)\geq\mathcal{P}(i\downarrow\|\pi\uparrow,u\uparrow)$	0.06	7.42	0.00

"Structural break"

Table 34: Ordered probit – Michigan Survey

	Before 1987	After 1987
Inflation	0.136***	0.101***
	0.005	0.004
Unemployment	0.194***	-0.042***
	0.007	0.006

Table 35: Ordered probit – SPF

	Before 1987	After 1987
Inflation	0.177**	0.071***
	0.057	0.026
Unemployment	0.076	-0.423***
	0.056	0.027

"Structural break"

Table 36: Ordered probit – Michigan Survey, by demographics

	Before 1987			
	Income		Education	
	Low Income	High Income	No High School	College
Inflation	0.08**	0.098***	0.154***	0.155***
	0.033	0.027	0.013	0.01
Unemployment	0.085*	0.13***	0.18***	0.193***
	0.051	0.041	0.018	0.013
	After 1987			
	Income		Education	
	Low Income	High Income	No High School	College
Inflation	0.114***	0.101***	0.119***	0.097***
	0.009	0.007	0.014	0.006
Unemployment	0.02	-0.113***	0.003	-0.09***
	0.014	0.011	0.021	0.01

Conclusion

- Study the consistency of households' joint forecasts for interest rates, inflation, and unemployment with Taylor rule
- Results consistent with awareness of Taylor rule
- Vary by demographics (income, education)
- Evidence of ability to detect "structural break"